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FOREIGN TECHNOLOGY DIVISION

INDUSTRIAL BUILDINGS AND STRUCTURES.
CONSTRUCTION.
ALBUM OF DRAWINGS.

by

I.A. Shereshevskiy

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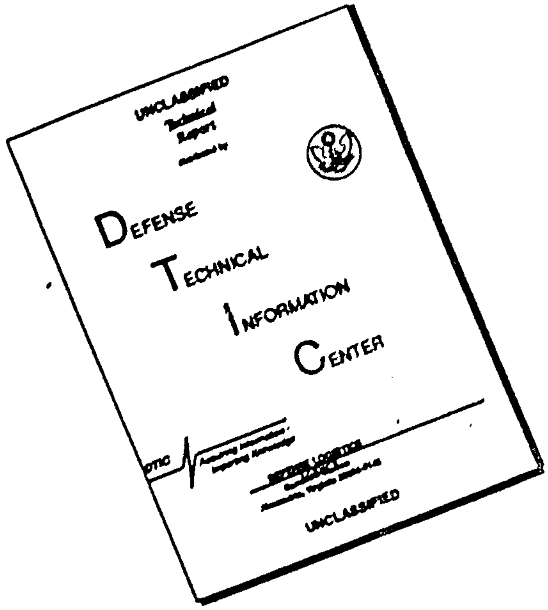

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INDUSTRIAL BUILDINGS AND STRUCTURES. CONSTRUCTION ALBUM OF DRAWINGS.

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

INDUSTRIAL BUILDINGS AND STRUCTURES.
Construction. Album of Drawings.
I. A. Shereshevskiy.

Reviewers: the department of the architecture of Moscow Engineering-construction institute in honor of V. V. Kuybyshev; the department of the constructions of industrial buildings and constructions of Moscow architectural institute.

Scientific editor is the chief designer of the institute Lenpromstroyproyekt eng. I. L. Shapovalov.

The book represents by itself the collection of the drawings of the standard standardized and experimental constructions of the industrial buildings of common/general/total and special designation/purpose and industrial constructions - communications and capacitance/capacities, intended in essence for displacement and storing different materials.

For developing the space impression, the structural/design systems of objects are shown in axonometric cut/sections. They are accompanied by the image of the cell/elements of assembly and assembling assemblies. The most popular standardized cell/elements of the single-story buildings are removed into separate chapters.

The drawings of collection are comprised based on materials of leading designed and scientific research institutes. Organizations - authors of the separate projects are indicated in explanatory text.

The book is textbook for the academic planning of industrial complexes and it is intended for the students of the architectural, construction and technological departments of VUZ.

Page 3.

Part one.

INDUSTRIAL BUILDINGS.

The unceasingly growing Soviet industrial construction is conducted on the base of construction industry, which ensures the prefabrication of cell/elements and the assembly of buildings.

The unification of industrial construction is carried out via the selection of the most general-purpose, structural/design and economical sections of buildings, constructions and their cell/elements. The implementation of the standardized buildings into the practice of industrial construction is provided by the development of the grid/network of manufacturing plants.

The unification of building logically is spread also to planning industrial of buildings. In 1964 were introduced into action the standardized standard sections (UIS) for different branches of industry. The albums of drawings of UIS contain plan/layouts, cut/sections and the assembly diagrams of the sections of the special-purpose buildings of common/general/total and and standard structural parts to them. They are developed in the stage of working project.

The performance of the common drawings of project is simplified by planar modeling - cementing of the cut out from albums fragments. The cemented/glued mock-ups of plan/layouts, cut/sections and facades are supplemented by individual data - by arrangement of walls, partitions, entrances, entrances, by the numbers of axle/axes, by size/dimensions, by designations, by references, etc.

The drawings of standard assembling and architectural-construction parts are applied in the form of albums or separate, used in project sheets.

In this period in the country, affect two nomenclatures of the standardized articles: the nomenclature of GOSSTROY of the USSR

intended for entire industrial construction, and the nomenclature, connected with specific peculiarities of thermal power stations. Both nomenclatures are spread to articles made of the precast reinforced concrete.

Because of service life, the incombustibility and the considerable savings of steel composite reinforced-concrete constructions were obtained for last/latter decennial widest use. From them are erected the foundations, load-bearing frames, the wall panels of coverings and coatings, staircases and other structural cell/elements. Majority structural/design of the cell/elements of contemporary industrial buildings is stored at the highly-mechanized plants of the precast reinforced concrete.

For steel construction is permitted at present to use for the framework/bodies of buildings with tap/cranes by the load capacity of more than 50 t or by the height of more than 18 m.

In a series of the cases, economically expediently crane beams for the tap/cranes of any load capacity and a farm/truss by flight/span are more 24m to perform in metal and to set to composite reinforced-concrete columns. For simplification in the structural/design assemblies, longitudinal communication/connections and other small cell/elements almost always are made from steel

rolled stock. Steel window panels are applied into the buildings of arduous duty (surplus heat releases, special temperature and humidity conditions/mode, etc.) and the increased stability, and steel light farm/trusses and interlacings in connection with their relative structural/design simplicity - in all buildings with upper illumination.

In experimental order and in special for carrying structures are applied high-strength steel, and for those enclose - light metals and plastics.

The selection of one or the other material must be produced on the basis of the economic analysis of the cost/value of construction taking into account local material resource/lifetimes.

Rapid development of construction science and technology in our country continuously affects new materials and the methods of construction.

The given below standard and experimental solutions of the structures of industrial buildings make it possible to be oriented in the basic developmental trend, but they cannot pretend to the comprehensive completeness.

List 1. Classification of industrial buildings.

According to volumetric-planning solution industrial buildings are subdivided into one- and multistage, solid and pavilion building-up. The multistory buildings are applied in essence under conditions of the squeezed urban building-up and for productions with by vertical technological processes. The buildings of solid building-up make it possible to more compact organize technological process. The buildings of pavilion building-up have advantage in the relation to natural illumination and airings.

The buildings of solid building-up depending on presence and arrangement of internal columns are subdivided into multispan, cellular and hall.

Flight/span is called the internal volume, limited by two series of columns and end walls. Flight/span is equipped by suspension single-beam tap/cranes by load capacity from 1 to 5 t or by supporting/reference bridge cranes by load capacity from 10 to 500 t. Flight/span is called also the distance between the supports of the primary constructions of coating.

The distance between supports along their series is named step/pitch.

Flight/spans determine the directivity of the production lines and are furnished, as a rule, in one, but for separate productions - in two mutually perpendicular directions. The transition of the production line into adjacent flight/span causes a series of operational and structural/design difficulties in connection with the absence of transport communication/connection and encountering frequently encountered need for a local increase in the step/pitch of columns.

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In the cellular buildings of column, they are furnished in the apex/vertexes of close to square rectangle. Cellular buildings are equipped suspension single-beam by the tap/cranes, which pass in the different of the level and in both directions, and they make it possible to freely maneuver with the direction of the production lines. In them is inherent the flexibility of planning and, to a certain extent, universality.

The hall buildings of large depth with flight/spans to 100 m (assembly shops of aircraft-construction plants, the experimental bodies of particle accelerators, etc.) provide timeliness of

large-size machines and experimental equipment. They are equipped by suspension and outdoor means transport.

The buildings of pavilion building-up are subdivided into one-two span, pavilion and hall. One-two span buildings are applied for shops with surplus heat release. Pavilion are high cockless buildings with the built-in bookstands for equipment. Pavilion buildings make it possible to combine the processes, which occur/flow/lasted earlier in one- and the multistory buildings, and relatively it is simple to reconstruct them during the subsequent changes in technology. Pavilion buildings are common in chemical industry and begin to be applied in other branches. The hall buildings of small depth - hangars they are equipped by the opened end-type walls, which make it possible to leave beyond their limits the tail part of the large-size aircraft and for that of similar machines.

The coatings of single-stage span buildings are made in essence from the standardized linear cell/elements - plate/slabs. of beams, the farm/trusses, which consecutively transmit to each other the assembled load. At the same time begin to be introduced three-dimensional/space constructions - cylindrical shells, compartmented slabs, etc.

For the coating of cellular buildings together with linear cell/elements, are used sheds - plicated constructions with the lamp/canopies of one-sided orientation, cylindrical shells, etc.

The flight/spans of hall buildings overlap with the lightened farm/trusses from high-strength alloys, with guy constructions, reinforced-concrete arches and the shells of double curvature.

In buildings with artificial illumination and climate intersupport space for hygienic and sanitary-engineering reasons it is desirable to separate/liberate by the suspension ceiling, above which in the so-called technical garret are placed the air ducts, electrical conductors, etc. Further development of this type of the coatings, which combine framework and communications, represent flooring from T-shaped vacuum plate/slabs.

The multistory buildings of solid building-up from close to square by the grid of columns which can be rarefied in the upper level, represent in essence cellular type. During girder floors with load to 1.5 t/m² and more the grid of columns with respect is accepted 6x9 and 6x6 m. Girderless type coatings with flat/plane ceiling, used for hygienic reasons in food industry (coolers, etc.), are raised with the grid of columns 6x6 m. The coatings of the upper levels with the rarefied grid of columns are analogous in their

construction to the coatings of single-stage span or cellular buildings. The application/use of strut constructions and monolithic caissored plate/slabs in the buildings, raised by the method of lifting the decks, makes it possible to increase the grid of columns to 12x12 m.

The multistory buildings of pavilion building-up are made in essence two-three span with that amalgamated span in the upper level. An increase in the flight/spans of lower production decks to 18 m and more can be reached by the application/use of farm/trusses. In intersupport space are placed the technical decks, utilized for the passage of different communications and under subsidiary, storage and everyday locations.

Being furnished above each production deck technical decks form in the majority of productions the excess of auxiliary area. To rationally place the technical decks through two production decks, then the overlap of lower of them is realize/accomplished on the internal columns, which rest on farm/trusses.

Sheet 2. Unified parameters of single-stage span buildings.

The wide propagation of plant articles made of steel and precast reinforced concrete of limited nomenclature, designed in essence for

the assembly of span industrial buildings, is based on unified modular system whose rules in short presentation are reduced to following.

One should design/project the industrial buildings of rectangular configuration, without jump/drops in the heights, with the flight/spans of one direction. Jump/drops in the heights from 1.8m and more are allow/assumed in the considerable area of the lowered/reduced part; the flight/spans of two mutually perpendicular directions are applied when, in this case, essential technological advantages are present.

Modular system is based on planning module/modulus into 0.5 and high-altitude in 0.6 m. All cell/elements of the enclosure/protection of buildings - wall and window panels, gate, including the framing frame, the flooring slab and overlaps and so forth are multiple on basic nominal[1] measurements to these module/moduli.

FOOTNOTE [1]. Nominal sizes unlike the structural/design consider the clearances between cell/elements. ENDFOOTNOTE.

The grid of columns, forming by their center lines, is multiple to the amalgamated planning module/moduli in 6m for single-stage and 3m - for the multistory buildings.

The columns of an extreme longitudinal series and of longitudinal deformation welds are combined by external faces with longitudinal axes (zero joining) or are misaligned by 250 and 500 mm outside building (joining "250", "500").

The columns of an extreme transverse series (end-type) and of transverse deformation welds are misaligned from center lines to 500 mm inside the temperature section of building.

The columns of average longitudinal and transverse series are combined by the axle/axes of section/cuts with the grid of center lines.

The zero joining of extreme longitudinal series is applied for multistage and single-stage cockless buildings and in buildings with tap/cranes by load capacity to 30 t, with the step/pitch of outer columns in 6m and to height from sex/floor to the bottom of rafter constructions it is not more 14.4m. Zero joining eliminates application/use in the coating of final assembly cell/elements.

Joining "250" is applied with any of the characteristics indicated below - crane load 50 t, the step/pitch of extreme columns

12m, the height of building (16.2 and 18m. In other cases with structural/design need, is applied the joining "500".

Distance from the longitudinal axis of columns to the axle/axis of the cylinders of tap/crane is designated into 750 mm for tap/cranes with lifting capacity of up to 50 t and into 1000 mm - for the tap/cranes of larger load capacity.

The increase of total distance from external edge of column to the axle/axis of the cylinders of tap/crane or between the axle/axes of the cylinders of tap/cranes in adjacent flight/spans with the increase of their lifting capacity makes it possible to place the "neck" of the columns and the "tail" of tap/crane, approach/approximation between which is allow/assumed into 60 mm.

During the intense use of tap/cranes (average and arduous duties) and in the buildings of arduous duty (see SNIP [Construction norms and regulations] 11-V. 3-62, appendix VI) it appears the need for the device of passes for inspection and repair of crane ways. In this case the distance from the axle/axis of columns to the axle/axis of the cylinders of tap/crane is received in 1000 mm for tap/cranes as load capacity to 50 t and into 1500 mm - for the tap/cranes of larger load capacity.

The crane dimension of building (height from the knob/cap of rail to the bottom of rafter constructions) includes the height of tap/crane and tolerable approximation of 100 mm for light, medium, and heavy-duty cranes, and 250 mm for extra-duty cranes.

Page 5.

The classification of tap/cranes under of work gives in the "rules of device and safe operation of cranes".

For limiting the effort/forces, which appear in constructions from jump/drop in temperature, building it is cut by deformation welds on section. The size/dimensions of sections depend on the material of framework/body and thermal condition of building. For the heated buildings with reinforced-concrete framework/body from the standardized cell/elements of the distance between transverse deformation welds, they are accepted to 72, and between longitudinal to 144 m.

Structurally transverse deformation welds they are made on two columns, misaligned on 0.5 m from welding line inside each section.

In the buildings of solid building-up, longitudinal deformation seams are made with reinforced-concrete framework/body on two

columns. The size/dimension of the inset between the longitudinal axes of these columns is accepted into 0.5; 1.0 and 1.5 m so that minus of joinings the distance between columns in world/light would be not less than 0.5 m.

With steel supports with tip bearings longitudinal deformation welds are made on one column.

Jump/drops in the heights, as a rule, are combined with deformation welds.

In the lower part of the sheet, is given a series of reference data from the parameters of buildings and crane equipment.

Chapter I.

SINGLE-STORY BUILDINGS.

Industrial buildings sharply differ from other forms of buildings in appearance and the constructions used. The occurring in them technological processes require considerable dimensions on area and height of locations. In majority the case they are serviced by supporting/reference or suspension tap/cranes.

Considerable dead loads of the constructions, crane equipment, snow and wind are absorbed by steel or reinforced-concrete framework/body. The building shell is formed by the strengthened to framework/body lightened enclosing cell/elements - wall and window panels and flooring slabs.

To the cell/elements of framework/body they are related: foundations, columns - outer, average and frame (last/latter are designed only for fastering of walls), foundation and crane beams, the trusses or the beams, carrying coating, and frame-supporting farm/trusses or the beams, which overlap the increased step/pitch of average columns.

The framework/body of the single-story building consists of the transverse frames, formed by the pinched in foundations columns, and by the hinged resting on columns trusses or beams. Lengthwise of frame, are connected by the crane beams, girder bracings, the rigid disk of coating and in the necessary cases by steel communication/connections. Rigid disk forms the flooring slabs, welded to the trusses or beams with the subsequent monolithization of welds.

The stability of building in longitudinal and transverse directions is provided by the rigidity of the disk of coating and pinched in foundations columns, but at height it is more 9.6m, in flight/spans with supporting/reference tap/cranes and with flat/plane roofs - by additional longitudinal communicating systems between columns and the buck stays of farm/trusses.

Communicating system between columns consists of four-way (with step/pitch 6m) or portal (with step/pitch 12 m) steel communication/connections, arrange/located in the average/mean step/pitch of temperature section, and supports which pass of flight/spans without the crane beams on the top of columns.

Steel vertical communication/connections between the buck stays of steel farm/trusses are establish/installed in the outer

step/pitches of section, and in the buildings of arduous duty - within one step/pitch, including above the connecting step/pitch of columns. Between themselves they are linked by the spacers, which pass on the top of columns.

In flight/spans with the frame-supporting farm/trusses of spacer, they are established in the level of their top in the extreme step/pitches of section.

The constructions of the coatings of the single-story buildings are subdivided into linear and three-dimensional/space. The first group includes the mentioned above farm/trusses or the beams, covered by the flooring of reinforced-concrete plate/slabs, the t-shaped reinforced-concrete plate/slabs, packed on frame-supporting beams, and to that similar articles. The cell/elements of this group work separately, consecutively transferring the assembled load in the direction of its supports. Linear constructions are simple in assembly and everywhere they are applied in industrial construction.

To the second group are related reinforced-concrete cylindrical and spherical shells, folds, compartmented slabs, steel suspended guy constructions with filling from reinforced-concrete plate/slabs, etc. They receive external effort/forces three-dimensional/space, providing the joint operation of the cell/elements of coating, which

makes it possible to lower the consumption of materials during the overlap of large flight/spans. The three-dimensional/space constructions of coatings are applied at present in experimental order and are introduced in practice by construction science.

Sheet 3. Single-stage cockless building from the standardized cell/elements with flat/plare coating on beams.

The standardized constructions in essence are calculated for application/use in the single-story buildings, most widely used in industrial construction. To them belong buildings with height from sex/floor to the construction of coating to 18 m with cockless flight/spans 12, 18 and 24m, the equipped if necessary monoblock suspended tap/cranes with lifting capacity of up to 5t, and with flight/spans 18, 24 and 30m, the equipped bridge supporting/reference tap/cranes by load capacity 10-50 t.

The step/pitch of extreme and average columns and resting on them rafter constructions can be 6-meter, 12-meter and that combined - 6-meter for extreme columns and rafter constructions and 12-meter - for average columns.

With further increase in the parameters indicated in connection with the requirements of technological process, the flight/span and

the step/pitch of columns increase multiply 6m, and height - multiple of 1.8m.

In connection with the mass production of the standardized 6-meter wall and window panels in extreme series of columns, is preferable 6-meter step/pitch. For the purpose of the effective and maneuverable use of the production areas in average series of columns, is most common 12-meter step/pitch. This is why in the majority of cases economical is the combined step/pitch, which combines the rarefied grid of columns with the possibility of the suspension of one-shaft tap/cranes.

6-meter step/pitch of average columns is applied predominantly in low double-transit of buildings where its increase complicates construction, without giving economic effect.

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The 12-meter step/pitch of extreme columns is combined with the 12-meter step/pitch of the trusses. This eliminates frame-supporting constructions, but it requires in the majority of the cases of applying the frame columns and within longitudinal walls for fastening of 6-meter wall and window panels. The 12-meter step/pitch of extreme and average splitting it is economical in high buildings

with supporting/reference to the tap/cranes of large load capacity.

The selection of the step/pitch of extreme and average columns and stapled constructions within the limits, permissible unified overall diagrams, is produced on the basis of the economic comparison of versions.

In the building of solid construcion in question is accepted the combined step/pitch 6m for extreme and 12m - for average columns. The roof is on truss beams with an 18 m span, resting on sub-rafter beams along central rows of columns. Lengthwise the stability of rafter system with respect to an extreme series of columns is additionally provided by steel communication/connections. Vertical steel communication/connections are established between beams on the edges of section and are connected between themselves by the steel spacers, which pass on the top of columns.

End-type or longitudinal framework is formed at the height of building from sex/floor to the bottom of rafter constructions 9.6m by the columns of rectangular cross section 0.5x0.5m And at other heights - by columns of rectangular cross section and with two-branch columns whose sheathing size/dimensions are given to sheet by 42.

Frame columns are developed taking into account the use of forms of the basic columns of single-stage industrial buildings on series

KE-01-49 and KE-01-52. They are designed under the assumption of hinged support on top to the rigid disk of flooring slabs or the horizontal farm/trusses, which pass in the end/faces of buildings with the 12-meter step/pitch in top level of basic columns.

In the level of rafter constructions, frame columns are supplemented by the steel extensions of double-T section/cut, in level of parapet, - by the nozzles with angle brackets which envelope into the vertical welds between parapet panels.

Those misaligned to 500 mm basic columns are supplemented on entire height to the plane of end-type wall by the struts of end-type framework of two channel bars No 20.

Middle flight/spans are illuminated with the natural light through the paired zenith lamp/canopies in the form of the double cupolas from fiberglass, fasten/strengthened to keramzit-concrete beaker/sleeves.

Zenith lamp/canopies are established to firmed reinforced-concrete plate/slabs with the thickened flanges in the places of light apertures.

Drain internal through the waters intake, arrange/located near

basic columns. For the preservation of water-insulating carpet from softening and cracking, flat/plane roofings in summer period bay with water screen by layer to 50 mm.

The production area of building is serviced by the suspension single-beam tap/cranes whose carrier beams are suspend/hung to the rafter beams of coating.

Sheet 4. The single-story building from the standardized cell/elements with sloping coating on farm/trusses.

In the building of solid building-up in question is also accepted the combined step/pitch; extreme flight/span 18 m, and middle - 24m. Coating on the segmental farm/trusses, which rest on frame-supporting farm/trusses along average series of columns.

The longitudinal stability of columns is additionally provided by shown on drawing steel cross bonds in middle step/pitch of an extreme series and by arranged/located cut of the field of drawing steel portal communication/connections in the middle step/pitch of average series.

The stability of farm/trusses in the process of operating the building is provided by disk of coating and by steel

communication/connections, adjustable in the plane of upper belt/zone in lantern apertures. They consist of cross bonds, arrange/located with a 6-meter step/pitch of farm/trusses in two cells, and which connect farm/trusses on the horse of the spacers.

In the buildings of arduous duty and with the supporting/reference tap/cranes continuous and of arduous duty lower flange is untied into middle of flight/span by vertical communication/connections, establish/installed in extreme cells, and by their connecting braces. In the period of assembly, all farm/trusses are linked on horse by the inventory steel spacers, removed after welding of flooring slabs.

Middle flight/spans are illuminated with the natural light through the longitudinal light-aeration lamp/canopies. The steel farm/trusses of canopy frame are welded to the laying cell/elements of the upper belt/zone of the trusses. Their longitudinal stability is provided by arranged/located in extreme lantern cells steel communication/connections, establish/installed in planes of glazing and coating of spotlight.

The water draining off the slopes of the roofing is collected in valleys and is abstract/removed through the arranged/located with an interval in 12 m of water intake into shower canalization/sewerage on

standpipes from cast-iron pipes.

The production area of building is serviced by supporting/reference bridge cranes. Crane ways pass on reinforced-concrete crane with shafts establish/installed on the arm of columns.

Sheet 5. Cell of the single-story building with flat/plane roofing and by technical garret.

The single-stage industrial building, calculated for the arrangement/position of two heterogeneous productions (textile factory and the shop of gas-discharge tubes), is constructed in Moscow in 1961. The authors of project posed before themselves the problem to find the new volumetric-planning solutions, facilitating the interbranch unification of buildings and their cell/elements, to the wide application of large-size reinforced-concrete cell/elements of prefabrication, to reduction in the specific indices of the cost/value of building, building labor consumption and consumption of materials and to the creation of the most favorable working conditions in the placed productions.

Building represents by itself rectangular housing with the step/pitch of average columns 12 m, flight/span 24m and height to the

bottom of rafter constructions 6m. According to the conditions of technological processes, production rooms are provided with constant temperature and humidity conditions/mode and illumination level. With the exception/elimination of canalization/sewerage, all utility networks pass in intersupport space, separated in technical garret.

The storage, operating, everyday and administrative locations are built in into basic housing in three levels (basement, floor level and mezzanines) are arrange/located along external walls and the transverse wall, which demarcates separate shops.

The construction, developed during the planning of building, it served as prototype for the shown unified columns of rafter and frame-supporting farm/trusses.

The longitudinal stability of rafter system is provided according to the average Feeds columns by frame-supporting farm/trusses, by the rigid disk of coating and by the additional spacers, which link the upper belt/zones of rafter and frame-supporting farm/trusses in the extreme step/pitches of section. On external series of columns, the trusses are untied by vertical steel communication/connections in the extreme step/pitches of section and are connected between themselves rafters which pass on the top of columns in remaining step/pitches.

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The arranged/located above the weaving shop suspension ceiling decreases the volume of conditioned air, is decreased noise level and it shields production locations from the dust, which is accumulated in intersupport space. It is made from the perforated/punched aluminum cassettes by size/dimension in plan/layout 0.6x0.6 m, suspend/hung to framework/body from steel angle irons. Cassettes are filled by sound absorber. In ceiling are built in lights with size/dimension 0.6x1.8 m with fluorescent lamps. For maintain/serviceing the utility networks above the ceiling, are provided for the pilot bridges from cut and drawn steel flooring.

Isolated by a suspension ceiling technical garret is utilized for the separation of drains - steel tubes, suspended on the upper belt/zone of building stock farm/trusses.

Enclosure/protection by the suspension ceiling of intersupport space improves the hygienic, acoustic and aesthetical qualities of the interior of industrial building, creating new possibilities for the indicative architectural solutions.

Sheet 6. Cell of the single-story building with flat/plane roofing from T-shaped plate/slabs.

Further development of the constructions of the coating of hermetic (with artificial internal climate) buildings with flat/plane roofing occurs on the line of the coincidence of carriers with air ducts and channels for other grid/networks. This makes it possible to forego the device of technical garret, to lower the height of building, to decrease the consumption they began and the labor consumption of the assembly of constructions.

In the given version combined carrying elements are made in the form of the reinforced-concrete t-beamed vacuum plate/slabs, which overlap flight/spans into 18 and 24 m. Flooring from t-beamed plate/slabs is packed on frame-supporting 12-meter reinforced-concrete H-beams.

The utilized as air ducts voids of plate/slabs provides a 14-fold exchange of air in hour in building with height to 7m and by width to 180 m. The voids between plate/slabs are closed by suspension ceiling from the flat/plane asbestos cement sheets, packed on framework/body from steel sections. They are utilized for the packing of light and power grid/networks, setting up of luminescent illuminating lamps and as additional air ducts if necessary to

increase exchange of air.

T-beamed vacuum plate/slabs are established floor upwards. Their inclined side walls are thickened in the lower part where is placed the prestressed fittings from high-strength wire 5 mm in diameter. Below side walls are connected by the cross connections between which are located holes for an exchange of air, filled by ventilation lattices.

Plate/slabs are molded from concrete of brand 400 in operating position on drawn-out benches in steel forms with the flaps. Core is made from high-strength wire 5 mm in diameter, tightened with interval of 40 mm on the perimeter of channel. In designed position the wire is record/fixed by diaphragms from cement mortar 15 mm in thickness, with adjusting scratches on outline/contour. Diaphragms are established within 3 m. The bundle of the tightened strings is wound by waterproof paper.

The strings of working fittings are broached and rest on the device of core. The molding of plate/slabs is performed from plastic concrete of brand 400 or small engraving. The removal of the molds begins later 10-12 hours after the beginning of concreting. The strings of core are tempered, they are drawn on the blocks, arrange/located in one of the ends of the paired setting up, they are

transferred to the adjacent bench where in the period of hardening of concrete on the first bench is produced the preparation of form. After the achievement by concrete by 70o/o of calculated strength removes itself external on-board planking, is produced the descent of the tension of the stressed fittings and from channel are removed cement diaphragms.

The assembly of coating from t-beamed vacuum plate/slabs is conducted by self-propelled tap/crane by load capacity 15 t.

Sheet 7. Single-story building with coating from composite compartmented slabs.

Box cell/elements - reinforced-concrete cap/hoods by size/dimension in plan/layout 3x3 m, by height it is not less than 1/30 flight/span, with walls and bottom 20-35 mm in thickness, connected by that passed between them by guys into plate/slabs with span of up to 30 m, form floors and the roofs of industrial buildings.

From box cell/elements the plate/slab is assembled on the bench where for the purpose of an increase in the plant readiness it is covered with the warm roofing, which consists of coating with steam insulation, the light-concrete heater of asphalt tie piece and lower

layers of water-proofing covering. Heater from synthetic materials can be glued or fasten/strengthened to kapron knob/buttons from within - between the fin/edges of bottom of box cell/elements.

For the device of upper illumination in the bottoms of cap/hoods, remain the lantern holes, filled with glass blocks or covered with cupolas from fiberglass.

Bench for the assembly of plate/slabs is furnished over construction area. Installation of plate/slabs in the coating is done with self-propelled, tower or gantry cranes by load capacity 15-30 t.

With the step/pitch of column of 6 or 12 m, three-meter plate/slabs rest on the on-board reinforced-concrete rib beams, passing along longitudinal center lines, or are paired to rest directly on columns.

When the power of erecting cranes is insufficient, the pairing of plate/slabs is produced on designed mark with the application/use of inventory scaffoldings.

Compartmented slab - three-dimensional/space construction, are combined the carrying and enclosing functions. It overlaps flight/spans to 30 m, it is installed from transportable reinforced-concrete cap/hoods of two typical dimensions and somewhat decreases the overall consumption of steel of 1 m² of the coating (see Table 1 of application/appendix).

Sheet 8. Plate/slab from box cell/elements.

Compartmented slabs can be planes or paired. In the first case reinforcing beams they pass on steel detents curvilinear (with dip), in the second case - it is rectilinear. Plate/slabs are assembled from the thin-walled reinforced-concrete cap/hoods of two typical dimensions whose bottom is intensified by two mutually perpendicular fin/edges 150 mm high.

Of supporting/reference cap/hood side walls are thickened and are equipped with groove/slot and seat/socket for the anchoring of the beams of fittings. In the paired plate/slabs with a width of 6 or 12 m the end-type wall of supporting/reference cap/hood also is thickened and is supplied with the issues of reinforcement.

Cap/hoods are reinforced by steel meshes and are molded from concrete of brand 300-500 in the steel spring-loaded forms with fixed punch/male die (internal insert/bushing) and the flaps, equipped with vibrators. The formed cap/hood breaks away by jacks and is remove/taken from punch/male die by tap/crane. Weight of series cap/hood, 1.5 t, supporting/reference 2.4-2.9 t.

On assembly bench the cap/hoods are established in jig, accurately fixing their mutual arrangement in plate/slab. In intermediate joints is cranked up the framework/body from racks, which forms the planking of U-shaped concrete welds. The monolithization of welds is produced by concrete on the small gravel of brand 300-500 (analogous/similar with concrete of cap/hoods).

Reinforcing beams in outside approximately 50 mm diameter are fastened in supporting/reference seat/sockets, and at output/yield from groove/slots, they are consolidated for decreasing the width of welds. The tension of beams "to concrete" is produced by jacks under load equivalent calculated effort/forces. For are sew from corrosion the tightened beams they consist into concrete ring.

Page 8.

Sheet 9. The single-story building with coating from cylindrical shells.

Sheet 10. Cylindrical shells - cell/elements and assembling assemblies.

Composite monolithic reinforced-concrete shells represent by themselves the three-dimensional/space constructions, used for the

coating of buildings with the step/pitch of columns 12 m and more.

In form they are subdivided into cylindrical and the double curvature, which cover the mesh of columns from 12x18 m to 12x98 m, and spherical, that cover the mesh of columns from 18x18 m to 36x36 m.

Cylindrical shells consist of on-board cell/elements and the which form coating plate/slabs. The on-board cell/elements of shells are made in the form of the beams of double-T section/cut with curvilinear upper belt/zone by flight/span 18 and 24 m, shown on drawings, and composite tied arches by flight/span to 96 m. Plate/slab-shells by size/dimension in plan/layout 3x12 m have cylindrical surface with curvature in the direction of maximum size; thickness flanges 30 mm, the height of fin/edges 250 mm; the extreme plate/slabs of shell differ from Privates in terms of the intensive contour fin/edge.

The curved surfaces of on-board cell/elements and the adjacent them faces of plate/slab-shells are equipped by the issues of reinforcement and by the keys, which reliably ensure the joint operation of the construction with embedded joints.

The contour fin/edges of outer plate/slab-shells abut against

tightening and with monolithization form the contour of arches, which ensure the three-dimensional/space rigidity of construction.

All the composite cell/elements of coating are made from concrete of brand 400. Joints are assembled in one piece by concrete of the same mark/brand. On-board cell/elements and tightening are reinforced with preliminary stress. The unstressed series of plate/slab-shells can be modeled with the lantern holes above which are established transverse lamp/canopies whose width is 3 m and whose length is on 6 m shorter than the flight/span.

The framework/body of building is installed from the standardized cell/elements for a step/pitch 12 m. End/faces and transverse deformation welds can be solved with the taken with coatings from linear cell/elements shift of columns on 500 mm inside section from extreme transverse axes or with insets into 0.5 and 1.0 m analogous with longitudinal deformation welds.

The shift of columns in end/faces and transverse deformation welds is characteristic for flight/spans with supporting/reference tap/cranes. It generates a need for the additional typical dimensions of plate/slab-shells by flight/span in 11.5 m, but do not require final assembly cell/elements in the crane beams and wall panels.

In cockless buildings the inset generates a need for final assembly cell/elements only for wall panels, remove/taking the additional typical dimensions of plate/slab-shells (see sheet 11).

The clearance between shells in deformation welds and the place of contiguity to the end-type wall of building overlaps those concreted in the course of assembly by monolithic reinforced-concrete deflectors.

The clearance between the shell and parapet panels, which appears with joinings "250" and "500", overlaps with final assembly reinforced-concrete plate/slabs, used in the standard parts of roofings. In architectural sense more clearly expresses construction repeating the curvature of shell the cornice completion of walls. Cornice plate/slabs with carrying out to 1 m represent by themselves the part of the outer plate/slab-shell and are made in its form.

The assembly of coating is produced by self-propelled tap/cranes by load capacity to 25 t.

Sheet 11. The single-story building with coating from spherical shells of those collected from cylindrical plate/slabs by length into half-span.

The spherical shells in question are formed by cylindrical, trapeziform in plan/layout of plate/slab-shells by flight/span into 9 and by 12 m, amalgamated into arches by flight/span into 18, 24, 30 and 36 m. Surfaces of series arches - spherical quadrangles from that build up to the middle of flight/span by width. The width of the surface of extreme arches to middle of flight/span correspondingly decreases. Arches are packed to on-board cell/elements in the form of the assembled from blocks Vierendeel trusses.

Arches by flight/span into 18 and 24 m are assembled of two, but flight/span into 30 and 36 m - of three plate/slab-shells are tightened by assembling tightening. Greatest weight of the amalgamated arch 17 t.

Consolidation assembly is produced in the zone of action of erecting crane.

Spherical shell is applied in essence for the coating of cellular type cockless buildings. In the end/face of building and of deformation welds the center lines are arranged with insets into 0.5 and 1.0 m. The construction of deformation weld is analogous shown on sheet 10. The cornice, which goes over the outline/contour of shell, in this case is made from reinforced-concrete cornice plate/slabs 1 m in wide, packed on panels with curvilinear configuration.

The assembly of shell begins from the setting up of three on-board cell/elements. To on-board cell/elements consecutively are packed the which form shell arches. The fourth, last/latter on the course of tap/crane on-board cell/element is established before the adjacent it extreme arch. Joints between cell/elements in cutting of the surface of shell loop, and in supports to on-board cell/elements - loop from welding the ends of reinforcement.

The assembly of coating is produced by self-propelled tap/cranes by load capacity to 25 t.

Sheet 12. Spherical shells of flat/plane square plate/slabs.

Another form of cutting spherical surface represent the shells, assembled from flat/plane square plate/slabs. The shell of shell in this case acquires the form of polyhedron with the rhombic faces, inscribed into spherical surface. The squares of plate/slabs are supplemented to rhombs because of small changes in the width of welds.

Plate/slabs by size/dimension in plan/layout 3x3 m with diagonal fin/edges 0.2 m in high are subdivided into Privates, angular and

extreme. Angular and extreme plate/slabs on the outline/contour of shell are equipped by the intensive contour fin/edges. On-board cell/elements in the form of segmental farm/trusses consist of the upper belt/zone, formed by the contour fin/edges of plate/slabs, lower belt/zone - tightening from the beams of high-strength reinforcement in reinforced-concrete ring - and struts.

The assembly of shell is produced on the steel curve pieces, moved in the assembled form from flight/span into flight/span. During the assembly of plate/slab, they are established to curve pieces, being combined by diagonal fin/edges with the diagonals with rhombic faces, and they are connected between themselves by welding the issues of reinforcement and monolithization of welds. Contour fin/edges are linked by loop joints.

The lower part of the farm/truss is fed under shell in the amalgamated form and is connected with upper belt/zone via the monolithization of loop issues in the groove/slots of contour fin/edges.

The on-board farm/trusses of adjacent shells are united by common/general/total tightening.

The cell/elements of the assembly of the shell in question are simple in form and are transportable, but are relatively small how is generated a need for itself metal-consuming steel curve pieces.

Page 9.

During further development of construction and methods of the production of works, which include the ground-based consolidation assembly of the cell/elements of the cupolas, indicated the shortcomings can be partially removed.

Sheet 13. The single-story building with suspended roof.

Sheet 14. Parts of suspended roof.

The single-story building with suspended roof has a grid of center lines 12x(12+78+12) m. The side 12-meter flight/spans of building are furnished under spans of supporting frame and are utilized for the arrangement/position of auxiliary locations.

The combined with the plane of drawing out inclined walls are filled with lantern type window panels, which ensure illumination of entire room. Anechoic end-type walls repeat the line of the coating with parapet with smooth outline/contour with brick and ledged - during panel solution.

The characteristic for a suspended roof configuration of building and the combination of the large anechcic and vitrified architectural solution.

The framework/body of building form triangular frames, overlapped in tangent to the adjacent guys of plane by the double-T on-board beams of coating. Frames consist of column by section/cut 0.7x0.7 m and inclined prestressed drawing out. Drawing out is installed of 16 steel rods 36 m in diameter, which penetrate four concrete cell/elements through the channels, placed over double-T section/cut.

At height 15 m drawing out is completed by the shaped end, which rests on column and forming supporting/reference seat/socket for on-board beams.

At depth 11 m drawing out is fastened into soil by the plate anchor, connected with linear cell/elements by supporting/reference "buoy/barrel". Plate anchor is installed of four conical quadrants, connected by welding the issues of fittings.

Column is establish/installed in pediment with glass type base.

Between foundation and drawing out, is cranked up the spacer, partially receiving the loads of inclined wall.

The coating of building is formed reinforced by drawing by steel guys whose length is up to 81 m and whose diameter is 40 mm. Guys are furnished through 1.5 m. Their dip or flight/span 78 m changes from 7 m in the middle of building to 10 m on its edges.

A difference in the dip of guys creates the second curvature in the middle part of the coating. As a whole it acquires saddle-shaped form with natural drain to the middles of end-type walls.

Coating is filled with reinforced-concrete plate/slabs by size/dimension in plan/layout 1.5x1.5 m and 25 mm in thickness. The faces, which adjoin the guys, intensified by ribs 80 mm high and are equipped by L-shaped issues.

Transverse faces are equipped by the loop issues, linked on assembly with twists from wire. The welds between plate/slabs are assembled in one piece by concrete or small gravel. Steam insulation - greasing by hot bitumen; heater - soft wood-fiber boards; roofing is rubercid on asphalt tie piece.

The assembly of building begins from consolidation assembly and

the stress of drawing out, conducted in horizontal position. The section/cut of channels in the joints of the concrete cell/elements of drawing out is record/fixed by steel sealing rings. Gross weight of drawing out 46 t. The weight of other cell/elements of framework/body does not exceed 27 t.

Installation of framework/body is conducted by two self-propelled cranes with load capacity 30 t.

In order to avoid the displacement/movement of plate anchors, special attention is given to the packing/seal of back filling.

The suspension of guys and the supply of roofing sheeting is conducted by means of tower crane by load capacity in 3 t.

The monolithization of the welds between plate/slabs is produced after the surcharge weight of the coating with packing brick.

Guy constructions provide the economical coating of large flight/spans. They can have extensive application in garages, hangars and other craneless production buildings.

Chapter 2.

MULTISTORY BUILDINGS.

The consumption of basic materials and the labor consumption of the assembly ~~to of~~ for 1 m² of the production area of the multistory building with the grid of columns 6x9 m with a static useful covering load of up to 1.5 T/m² are 1.5-2 times more than for 1 m² of the area of the single-story building with the grid of column of 12x24 m with the unlimited according to character and in value payload of sex/floor.

At the same time multistory industrial buildings on the basis of all expenditures are more economical than single-stage: with the necessity for considerable production areas (from 10000 m²) - as a result of the compact arrangement/position of technological process; with the arrangement of production for urban feature - because of the maximum use of the squeezed sections, during the developing on vertical line technological processes - because of the exception/elimination of excessive communications, the operating area/sites, etc.

Multistage production buildings are common in light, food, chemical and electrical engineering industry, in fine mechanics also

of the analogous, connected with processing of non-load capacity parts, productions.

The basic necessities of the branches of industry indicated satisfy the designed on the basis of interbranch unification multistage production buildings from composite reinforced-concrete cell/elements with the grid of columns 6x9 m with loads on overlap to 1.5 t/m^2 and 6x6 m - to 2.5 t/m^2, with the height of decks from 3.6 to 7.2 m, by a quantity of decks from two to five and by a quantity of flight/spans from two and more.

The framework/bodies of these buildings can be applied and as bookstands under technological equipment in pavilion type buildings and on the open pads.

Further perfection/improvement of construction in the direction of an increase in flight/span and step/pitch of columns is reflected in a series of experimental buildings and projects.

To their number belong the buildings, elevated by lifting the decks with the monolithic caissoned plate/slabs of overlaps and the grid of columns 9x9 m; the overlap of production decks by farm/trusses by flight/span to 18 m with arrangement in intersupport space of the operating locations; overlap from reinforced-concrete

cell/elements with steel strut frames by flight/span to 12 m of building with girderless overlaps, used in food industry. First two of them are shown in present section.

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Sheet 15. The multistory building from the standardized cell/elements.

Sheet 16. Standardized cell/elements and the assembling assemblies of the composite reinforced-concrete framework/body of multistory building.

Unified overall circuits of multistage industrial buildings provide for the grid of columns 6x6 and of 6.9 m and the height of decks 3.6; 4.8 and 6 m. Additional heights; 7.2 m for the first deck and the upper level by flight/span to 18 m, equipped with suspension tap/crane, and 8.4 and 10.8 m - for the upper level by flight/span to 18 m, equipped with carrier tap/crane by load capacity 10 t with the flight/span of the ground floors 6 m. Permissible loads on overlap with flight/span 6 m - from 1 to 2.5 t/m^2, with flight/span 9 m - from 0.5 to 1.5 t/m^2. the number of decks with flight/span 6 m - from 3 to 5, with flight/span 9 m - from 3 to 4. Width of buildings from 2

tc 10 six-meter or 7 nine-meter flight/spans.

The framework/body of building consists of a series of multistage frames with rigid joints. In transverse direction frame assemblies form the joints of cross bars with columns, realize/accomplished by a way of the tank welding of the issues of fittings, welding the laying of parts of column and cross bar and monolithization of entire assembly. Lengthwise the stability of building is provided by steel communication/connections, establish/installed into middle of section on each lengthwise series of columns.

The rigidity of building lengthwise can be provided by additional lengthwise monolithic or composite cross bars.

Monolithic cross bars are eliminated on the spot of intercolumn plate/slabs.

Composite longitudinal cross bars are installed in the steel stands, welded to the laying parts of columns in the level of reinforced-concrete arms.

Column are installed in essence from cell/elements with a height of in two deck. Cutting columns to two deck instead of that accepted

earlier by one deck makes it possible to conduct installation works without monolithization it is butting to height to four decks it eliminates outages, connected with story by story monolithization of framework/body.

Section/cut of columns 0.4x0.4 m for upper and 0.4x0.6 m for the ground floors.

All arms have identical carrying out.

For convenience in the installation works, the joints column are arrange/located on 1 m (0.6 m with the plate/slabs, which rest on the top of cross bars) higher than the top of the plate/slabs of overlap.

The height of all cross bars 0.8 m. Cross bars by flight/span 9 m prestressed. The flanges of cross bars 0.4 m in height can take concentrated loads to 15 t. With large loads from large-size taking up the sag of equipment of plate/slab, they are establish/installed on the top of the cross bars of rectangular cross section. Width of base plates 1.5 m, intercolumn 0.75 m. The length of the plate/slabs, packed on the top of cross bars, 6 m, and to the flanges of cross bars 5.55 m and of end/faces and deformation welds 5.05 m. Height of the longitudinal fin/edges of plate/slabs 0.4 m.

Plate/slabs under loads are more than 1.5 t/m² prestressed.

The indestructibility of flooring into calculation does not enter. It gives economic effect with loads to 1.5 t/m², on the necessary in this case monolithization it is butting plate/slabs it complicates the production of works is decreased the overall level of the prefabrication of building.

Constructions of the upper levels with flight/span into 12 and 18 m, equipped with suspension or supporting/reference tap/cranes, analogous to the single-story buildings.

Frames of bookstands and resource providing their rigidity are identical those accepted for the multistory buildings.

Sheet 17. Multistage building with intersupport decks.

The amalgamated grid of column makes it possible for more bending to place equipment, increasing the intensity of the use of areas. For example, during transition from flight/span 6 m the flight/span 12 m, the capacitance/capacity of the arrangement of equipment increases by 8-10o/o.

In the multistory buildings the amalgamated grid 6x12 m is

achieved by the overlap of production decks by nonslanting trusses. Intersupport space forms decks 3.6 m in high.

Intersupport decks are utilized in common buildings for the arrangement/position of auxiliary locations - administrative, everyday, laboratories, design bureaus, the ventilation camera/chambers and the like; in buildings with the increased requirements for internal climate, furthermore, for the packing of different engineering communications, which operate the sealed production decks.

The framework/body of considered production building consists of columns - extreme cross section of 0.3x0.6 m and by mean section 0.3x0.8 m, overlapped by Vierendeel trusses by flight/span 12 m.

The upper level can be overlapped by farm/trusses by flight/span 24 m and is equipped with carrier tap/crane by load capacity 10 t. In this case are here applied the columns by section/cut 0.4x0.6 m (is analogous with series KE-01-49), and extreme columns and the buck stays of farm/trusses in the ground floors respectively, are thickened. ¶ The plate/slabs of overlaps, analogous to considered above, they rest on the flanges of flanges. Section/cut of belt/zones t-beamed with the ledged surface, which forms concrete key with the monolithization of welds. The reinforcement of belt/zones is

stretched by electrothermal method.

The longitudinal stability of framework/body is provided by steel connections, adjustable by story in the first on the course of installation step/pitch of section, by the rigid joints of intercolumn plate/slabs and by the rigidity of disks, formed by consolidation of overlaps and coating.

The partial indestructibility of the monolithizedd flooring is reached by institution into the longitudinal seams between the plate/slabs of the supporting framework/bodies, which pass above the belt/zones of supports, the transverse seams are reinforced with U-shaped framework/bodies, welded before installation of flanges.

Transparent are flight walls are made from glass-reinforced-concrete panels with open/disclosed with steel transoms for aeration. During the appropriate solution it is butting between glass-reinforced-concrete panels it is reached the reliable seal of walls. Glass blocks provide the uniform natural illumination of work areas. For the purpose of the reliable anticorrosion protection of fastenings of the wall of the sealed buildings, can be assembled also from vertical glass-reinforced-concrete panels by height "to deck" and by width 3 m. Vertical panels are establish/installed on Faa brace beams. The latter rest on steel

pound, welded to columns within building not subjected to effects of external atmosphere.

Sheet 18. Multistory building, erected by lifting the decks.

The essence of the method of lifting the decks consists in the replacement of the cranes by the system of the hydraulic elevators, establish/installed on columns by height into building and which build up alternately the bundle of those concreted at the level of the sex/floor of the first deck of the plate/slabs of the overlaps by area into the section of building by designed marks with the assembled on them enclosing constructions and sanitary-engineering equipment deck.

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This method makes it possible to raise industrially of the building of any configuration, with different in height decks, with inclined overlaps - ramps, without disturbing relief and the vegetation of the directly adjacent section, and to carry out the assembly of all constructions at the level of the first deck.

The erection of buildings occurs in this sequence. Breaks away foundation area and are establish/installed foundations with glass type bases. Unlike the foundations of common buildings, the foundations of the buildings, erected by the method of lifting decks, test the considerable horizontal effort/forces, which reach of the greatest values during the lift of flooring slat. During this period the bending moment in the bearing edge of columns into pediment reaches to 10-15 tm. Fastening base to foundation plate/slab, the sides of the beaker and the framing of column are strengthened for receiving of maximum torque/moment. Structurally this strengthening is performed via the device of seat/socket in base plate for the installation of a base, increase in the depth of the framing of column and formation of the surface of the beaker/sleeve of separated part of the column with circular horizontal furrows for the formation of concrete key.

Columns are establish/installed from that strung on them according to the number of elevated overlaps by the pack of steel pivots (lifting rings) and by the fastened/strengthened to ends adapters - attachments for fastening of the hydraulic elevators and system of assembling communication/connections.

Certain inaccuracy in the arrangement of columns in the plan/layout of building on is important for lifting of the concreted

on the spot plate/slabs; least departure from verticality produces slants and it prevents the smooth lift of covering.

The verticality of the installation of columns undergoes instrument/tool testing.

In the process of installation, the ends of columns are untied by the system of four-way horizontal steel communication/connections, traced on the angles of building by the cantilever attached braces, which do not mix the lift of plate/slabs.

In the period of the assembly of column, work as separate, hinged attached on top by the system of assembling communication/connections, and after welding of the plate/slabs of overlaps - as struts of frames. In the first case those bend to torque/moment from load due to wind have great value. The ceiling of column according to the conditions of flexibility is equal to 30a:0.7, where a - the minimum size of section/cut. With the width of section/cut 0.4 m, it is 17 m.

By the erection of the buildings, which exceed the maximum flexibility of columns, is produced the time/temporary attachment of the built up plate/slabs, the growth of columns and the rearrangement of hydraulic hoists.

In foreign practice with the erection of buildings by the method of lifting the decks are applied the steel columns of tubular and double-T section/cut.

Collars serve for fastening of propeller thrust to the built up plate/slabs of overlap, they are the bushing, which slides on column in the period of lift, and by the cell/element of the assembling and constant fastening of plate/slab. They are manufactured in the form of rigid steel bushings, they are strung to columns and are welded before the concreting with the working reinforcement of plate/slabs.

The locks of collars (exact part with the combined holes of different diameters) make it possible to transmit the propeller thrust through the established/installed upper plate/slabs and to fasten their trapping nuts in the built up plate/slab.

For free slip is provided for the clearance between the bushing and the column in 5-8 mm. The assembling fastening of overlap is realize/accomplished on the laying steel rod, brought into the hole of story steel ring of column. The rigidity of frame assembly after lift is provided by welding the cell/elements indicated by means of those arrange/located from above and from below bolsters from steel

angle irons.

Plate/slabs are design/projected from two- and three-meter arms on the perimeter of the section of building. Arms serve for the equalization of span and supporting moments in plate/slab and their decrease in column, the arrangement/position of collars and formation of deformation and assembling welds. Step/pitch and the flight/span of framework/body are selected within the limits of 6-12 m. With the flight/spans of more than 8 m of the plate/slab of overlaps, they caisson on the sections between the passes of columns.

Caissons up to 1.2 m in long are formed by laying cardboard boxes. With the necessity for smooth ceilings, are applied the insert/bushings from lightweight concrete.

Before the concreting of the bundle of plate/slabs, are produced back filling of foundations, soil compaction and the device of the sex/floor of the first deck. Above columns of the first deck and by each plate/slab after the setting of concrete is packed separating layer from paraffin and oiled paper.

The reinforcement of plate/slabs is produced by knitted framework/bodies from the reinforcement of periodic airfoil/profile and by welded grids. In foreign practice is applied the preliminary

stress of reinforcement with tension on pan/pallet, considerably lowering the consumption of steel.

Simultaneously is installed the system of hydraulic lifts. The established/installed on the ends of columns hoists consist of hydraulic cylinder with that moving in it under pressure of heated oil plunger. In the period of working piston stroke, is built up on 50 mm and draws out after itself covering by means of the fastened/strengthened to his traverse screw thrust/rods. Simultaneously the nuts of propeller thrust on the traverse of hydraulic cylinder are pulled by lower hydraulic engine.

Then the forcing of oil ceases, and plunger under the effect of pull-back spring lowers to initial position, completing idling. During idling the entire overlap is absorbed by the crosshead of hydraulic cylinder. The nuts of propeller thrust on the traverse of plunger are pulled by upper hydraulic engine.

Average rate of climb of overlap 2.5 m/h; the rate of motion of plunger under load 1.5 m/min.

The lift of separate plate/slabs precedes the assembly of the enclosing constructions. The flat/plane or sloping roofing of building is performed from roll materials.

For wall enclosure/protections can be used the single-layer light-concrete or lightened sandwiches with effective fillers in up to 300 kg/m³ specific weight. The wall panels are fastened this case not to column, but to the plate/slab of overlap they absorb the weight of window panels within the limits of deck. The constructions of window panels depend on requirements for sealing of production locations.

Staircases from the reinforced-concrete marchs, which rest directly on the plate/slabs of overlaps, are furnished in special apertures. In certain cases of lift well and staircases, they are raised from monolithic reinforced concrete in movable planking and it is utilized for an increase in the stability of building.

The ramps, intended in garages and storages for the entrance of motor vehicles to the upper levels, are performed as separate sections of the plate/slabs of overlap, concreted, lifted and fastened in inclined position. In combination with the horizontal sections of overlaps, they also increase the three-dimensional/space rigidity of framework/body.

In the common cases the design concept of building of the raised

by the method of lift decks, represents by itself the frame framework/body, in which cross bars are the plate/slabs of overlaps, and the rigidity of frame assemblies is provided by welding on steel cover plates.

Reliably providing the overall stability of building, including earthquakeproof requirements, the method of lift allow/assumes the free arrangement of the columns, which pass through the concreted on the spot plate/slabs. In industrial buildings this design feature makes it possible to produce the selection of the value of flight/span, step/pitch and the height of deck most economically will conform in essence to the conditions of placement of technological equipment.

Page 12.

Sheet 19. Stair module built-in into building.

The built-in stairs block is intended for multistory building from the standardized cell/elements with the minimum grid of division axle/axes 6x6 m. The shaft/mine of staircase does not disturb the three-dimensional/space stability of framework/body, stretched between the cell/elements of multistage frames by columns, by cross bars and intercolumn plate/slabs of overlaps.

Staircase abuts the external wall. Its forming transverse panel internal walls are connected lengthwise by the bent stairs marchs and the closed story-by-story girder framework/body, which rests on the flanges of cross bars.

Stair steps 1.2 m in height are multiple to the provided for heights of decks. With an odd quantity of marchs within the limits of deck, story input doors are placed in both series of area/sites.

After staircase is placed the shaft/mine for communications. In buildings with the grid of columns 6x9 m the section/cut of shaft/mine can be increased for the installation of elevators by load capacity to 5 t.

Output/yield to roof and machine room of elevator they are performed in brick walls and are covered by the shortened plate/slabs, generally accepted of end-type walls and difformation welds.

At present wide acceptance have the transport units (staircases, united with passenger and cargo elevators), inserted within the primary walls between the sections of the multistory buildings from

the standardized reinforced-concrete cell/elements.

Sheet 20. Stair unit outlying for the outline/contour of the building.

The stairs blocks, outlying for the outline/contour of the building, are applied with large technological loads on overlaps (2-3.5 t/m²) for the purpose of the more complete and more economic utilization of a basic framework/body for the arrangement/position of the production areas.

The staircase in question is applied in the main housings of thermal electrical stations. Its framework/body consists of two multistage frames and their linking bent stairs marchs by flight/span of 6 m and 1.2 and 1.8 m in height.

Multistage frames are installed from installed in each other of frames by height into the total lift of the adjacent marchs each. The consolidation assembly of frames from struts and cross bars of prefabrication is produced simultaneously from end abutment the construction area.

Stairs marchs are packed with the growth of frames to the flanges of cross bars and are fastened by loop joints. The ceiling of

the self-supporting staircase 20 m. At larger height the section/cut of the struts of lower tiers increases, and frames are linked with the columns of building on marks 15 and 30 m by rings from steel clamps.

The wall enclosure/protections of staircases are gathered from the panels, accepted for a building. Natural illumination - through the window or glass-reinforced-concrete panels, arrange/located in the plane of frames or on longitudinal wall.

Chapter 3.

MAIN HOUSINGS OF THERMO-ELECTRIC POWERS STATION.

Soviet power engineering is developed on the line of the preferred building of powerful heat- and of the hydroelectric power plants, united by electric power lines into the power systems, which feed by energy the economic regions of the country. The problem of the erection of buildings and constructions for the accelerated growth of energy powers is solved in connection with the common/general/total tendencies of industrial construction.

Building thermal electrotechnical stations is conducted on the basis of the full/total/complete unification of the types of the buildings and in them of the composite reinforced-concrete and steel constructions used.

The specific special feature/peculiarities, which are inherent in the buildings of thermal power stations, the combination of single-story and multistory flight/spans, flight/spans, the connected with technological equipment special size/dimensions of flight/spans and heights, the increased loads on overlaps (to 3.5 t/m²), dynamic forces in foundations under equipment and so forth, will predetermine

the application/use of reinforced-concrete and steel articles of special nomenclature. It is spread in essence to the receiving increased loads the cell/elements of framework/body - reinforced-concrete foundations, columns, cross bars, girder bracings, the crane beams and the plate/slabs of floors; the steel farm/trusses of light construction, which overlap the flight/spans more than 36 m, and the intended for a step/pitch 12 m light-concrete and reinforced-cement wall panels and the reinforced-cement flooring slabs of double curvature. The basic condition/positions of the unification of the buildings of thermoelectric stations and the most widely used structural cell/elements, entering the nomenclature, illustrated in the drawings of the main housings whose cost/value comprises approximately 60o/o of cost/value of an entire thermo-electric power station.

Sheet 21. Circuits of the main housings of thermo-electric powers station.

Sheet 22. Main housing of gas-oil thermo-electric power station with thermoficated turbo-assemblies 50 MW in power.

The buildings of the main housings of thermo-electric powers station are subdivided into five types, which differ in terms of designation/purpose and the power of turbogenerators and in terms of

the form of the burned fuel/propellant.

In all buildings of main housings, are alternated the single-stage flight/spans of machine room and boiler with the arranged/located between them multistage flight/spans of bin-deaerating stand. The framework/body of building consists of multistage rigid frames and separate columns connected with frames by the hinged resting trusses.

Flight/span between the columns of machine room to 45 m, by boiler room - to 39 m and a bin-deaerating stand 12 m. Step/pitch of columns 12 m. One Of the end/faces of building constant, another allows for of expansion. The steel framework/body of time/temporary end/face can be carried out movable - movable or crane ways with the completion of the subsequent turns of building.

Length of the section of constant end/face 24 and 36 m. In it are furnished the fitting bay and all-station equipment. The length of the remaining sections of building is accepted to the multiple length of the cell of the block of turbine unit. At the power of turbine units in 300 MW, it comprises 48x2=96 m, in 200 MW - 36x2=72 m, with thermoficated turbine units 50 MW in power - 24x3=72 m.

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In the sections with a length of more than 72 m longitudinal series of columns are designed taking into account effort/forces from thermal strains. Sections are divided with transverse deformation weld.

Lengthwise the stability of framework/body in the section of constant end/face provide arranged/located in the second step/pitch on all series of columns vertical steel communication/connections; in the subsequent sections - frame units, formed by the rigidly connected to columns spacers. Before the monolithization of frame units, the longitudinal forces in the installed section are transferred to the preceding/previous section through that connected by time/temporary communication/connections deformation weld.

In buildings with thermoficated turbine units, the fitting bay is organized from the side of time/temporary end/face; for it in the direction of following section, is installed "passing" step/pitch - projection to one step/pitch of machine room with respect to boiler room.

The framework/body of main housing consists of foundations with subcolumns of the hemp type, columns, of the crane beams, spacers of

lengthwise series of columns, cross bars and the trusses. Overlaps and the coating of bin-aerator stand are formed by flooring from reinforced-concrete beams and plate/slabs with fin/edges 0.6 m in high and the packed between them flat/plane plate/slabs. Coating on farm/trusses is performed from reinforced-concrete plate/slabs with fin/edges 0.45 m in high and the reinforced-cement plate/slab-shells of double curvature. Wall enclosure/protections - from light-concrete panels whose height is 1.2 and 1.8 m and whose length is 12 m.

All cell/elements of reinforced-concrete framework/body are manufactured at the high(ly)-mechanized plants and are supplied by railroad to field. Depending on dimensions and the load capacity of the flatcars, the length of plant articles is limited to 13.8 m, and weight - 32 t.

The framework/body of all five types of main housings is assembled from a general-purpose set of reinforced-concrete articles, including 22 type of cell/elements of columns and 3 types of cross bars. The unification of the section/cuts of columns and cross bars provides for their manufacture in general-purpose rib forms. The fixed/recorded arrangement of working reinforcement in each of the section/cuts accepted makes it possible to produce in the joints of cell/elements the direct tank welding of rods.

The constructions of condensation basement consist of the bases of the glass type, columns, plate/slabs of overlap and panels of bulkheads. Columns by section/cut 0.3x0.3 m are establish/installed on the grid of center lines 3x3 m. Taking into account this grid are furnished the composite reinforced-concrete foundations of turbine units. The plate/slabs of overlaps rest in apex/vertexes on the ends of columns. On sections with apertures, the overlap is performed in steel constructions. As the panels of bulkheads, are applied the plate/slabs of the overlaps by size/dimension 1.5x12 m with fin/edges 0.6 m in high.

In general form all the constructions indicated are depicted on the axonometric cut/section of the main housing of gas-oil thermo-electric power station with thermoficated turbine units 50 MW in power, and in detail with assembling units and varieties - on the subsequent six sheets.

Sheet 23. Foundations with hemp type bases.

Composite reinforced-concrete foundations are packed to basis/base from concrete or the nonfreezing through soil on the condensed by vibration layer 50-100 mm in thickness of large or medium-grain sand. They consist of bases and base plates. Using the method of installation of columns, the bases are subdivided into

glass and hemp types. "beaker/sleeve" - the deepening, into which is cranked up the supporting/reference part of the column; "stump" - the projection, for which is establish/installed that center the supporting/reference part of the column "tooth". In the latter case the joint of column with foundation is realize/accomplished by a way of welding the issues of reinforcement with subsequent preconcreting of the supporting/reference part of the column in the altitude limits of tooth.

Foundations with hemp type bases are establish/installed under the heavily loaded columns by section/cut from 0.6x0.6 m. Welding the issues of reinforcement provides in joint the perception of the considerable bending moments and normal effort/forces. In all columns of main housings, beginning with series A, base is built up by the lower short cell/element of column - by stump, adjustable in the period of the zero cycle of the production of works.

The joint of stump with base is identical that described above.

The basic typical dimensions of base have identical t-beamed section/cut with width flanges 3 m and fin/edges 0.9 m. Bases are concreted in one form with different insert/bushings. Base under conjugate columns of the expansion joint is performed with the local broadening of fin/edge to 1.6 m on section 2 m in long.

Base plates - separate 0.3 m in thickness at length to 5 m and compound/composite 0.4 m in thickness at length 6 m. Compound/composite plate/slabs are enlarged in pairs before the assembly by means of the tank welding of the issues of reinforcement and concreting of clearance 0.5 m in wide.

Area of foundations - from 9 to 48 m. In basement locations the foundations can be establish/installed on the bottom of basement how is simplified the device of waterproofing. Bases are establish/installed to base plates, and the latter - on the bottom of basement on the layer of cement mortar of brand 50 15-20 mm in thickness.

The bottom of basement is performed from reinforced-concrete plate/slabs 0.3 m in thickness by nominal size in plan/layout 6x3 and 3x3 m. The plate/slabs of the bottom of basement will be joined on assembly on all contacted faces. Loop joints 0.3 m in wide are assembled in one piece by concrete of brand 200 and are supplied with additional issues on sections under the monolithic foundation of equipment. Lower than the level of ground water of the plate/slab of bottom of basement they are packed on a 50-millimetric layer of coarse-grained sand, which covers concrete preparation and

waterproofing. The construction of waterproofing depends on the pressure head of ground water.

Bases are molded from concrete of brand 300-400, of plate/slab - from concrete of brand 200-400 with the common and stressed reinforcement. Weight of the cell/elements of foundation - to 29 t. Installation is produced by the self-propelled tap/cranes of the corresponding load capacity.

Sheet 24. Constructions of basements and of underground economy.

Thermoelectric stations have the developed underground economy, which is placed in the basements of buildings and separate constructions. For the purpose of the application/use of the standardized composite articles, underground constructions analogous above-grade clearly are demarcated to enclosure/protections and load-bearing frame.

Bulkheads of the sunk to 5 m basements are performed with the step/pitch of columns 6 and 12 m, the caused step/pitch of above-grade framework/body. As panels in them, are applied the ribbed slabs of the overlaps 6x1.5 by m and 12x1.5 m, flat/plane plate/slabs 0.3 m in thickness by size/dimension in plan/layout 6x3 and 6x1.5 m and finned panels 6x1.5 m.

Bulkheads of the constructions, sunk are more than 5 m, they are performed with step/pitch of columns 3 m with single-stage and 6 m - during multistage solution. As panels and 6 m - during multistage solution. As panels with the step/pitch of columns 3 m, are applied the flat/plane and caissoned plate/slabs 3x3x0.3 m and flat/plane plate/slabs 3x1.5x0.3 m.

Fastening the panels, pressed or torn off from framework/body by pressure soil, is produced by the placed into the side seams bolts, respectively welded to laying cell/elements or the issues of the reinforcement of columns.

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The grid of the center lines of columns is received 3x3 as m in basements with load on the overlap of more than 1.2 t/m² and 6x6 m in basements with smaller load, and also in multistage underground structures.

With the grid of center lines 3x3 m of the plate/slab of overlaps - the caissoned or planes by size/dimension 3x3x0.3 m - are packed directly to the ends of columns. Flat/plane plate/slabs are

applied on the sections of overlaps, receiving loads from conveyers, railroad track or heavy equipment. Flat/plane plate/slabs are reinforced with the local condensation of rods, which creates the concealed/latent beams in necessary directions. The caissoned plate/slabs have on perimeter groove/slots 80 mm in deep, calculated to the support of insert/bushings.

The joints between plate/slabs are realize/accomplished by a way of welding the issues of reinforcement and monolithization of the welds, reinforced on individual sections by clamps or grids.

Sheet 25. Standardized cell/elements of the framework/body of main housing.

The basic principles of the design of the general-purpose set of the cell/elements of framework/body are presented in explanations to sheets 21 and 22.

The standardized concrete forms make it possible to manufacture the cell/elements of rectangular cross section from 0.3x0.3 m to 0.6x2.4 m - a total of 12 typical dimensions of section/cuts with double-T sections for the facilitation of weight, beginning with section/cut 0.6x0.8 m. Eight typical dimensions from a quantity indicated have constant thickness 0.6 m, which considerably reduces

the variety of on-board equipment.

The height of the separate cell/elements of columns, the alternation in them of rectangular and double-T sections, laying out and height of arms and height it is butting and supporting units they are subordinated to modular grid 0.6 m. For the multiplicity of the marks of the top of overlaps, the packed above plate/slabs 30-millimetric layer of cement sex/floor is compensated for by the decrease of the height of the supporting teeth of column (570 mm instead of 600 mm).

In order of arrangement, the cell/elements of column are subdivided into the stump, lower and the neutral cell/elements of shank and end. Stumps are establish/installed to foundations in the period of zero cycle. Further installation of columns is produced by the assembly of framework/body. The mating surfaces of cell/elements of prefaced or are supplied with laying parts and the issues of reinforcement in the form of joint.

The joints between the cell/elements of columns are subdivided using the method of joining into the dry and wet (latter are accompanied by wet processes), and on the place of execution to consolidation and installation.

Dry joints are realize/accomplished by a cover plate of the fastened surfaces (prefacing of the cell/elements of columns is performed by installation into the forms of the steel milled plate/slabs approximately 50 mm in thickness). Then cell/elements are connected by welding the arranged/located in trimmings reinforcing issues. After welding of the reinforcement of trimming, they are filled with the protective layer of cement mortar.

The execution of wet it is butting it begins from welding of the issues of reinforcement between the coaxially established/installed on tooth cell/elements it concludes preconcreting of joint.

Consolidation the butting of columns is applied when the erection equipment of large load capacity is present, - leather that makes it possible to install cell/elements up to 100 t in weight. It is produced by wet process by the horizontal position of abutting members in region of the action of erecting cranes and leads to the considerable acceleration of erecting cranes and it leads to the considerable acceleration of installation works. The field joints of columns are performed in essence by dry method directly in the process of the assembly of framework/body.

Dry joints are less labor-consuming, eliminate wet processes and the connected with them interruptions in the course of the

installation works for a set with concrete 70o/o of calculated strength. At the same time they are caused by the absolutely sensitive adjustment of lower cell/elements, hinder/hampered with foundation.

The straightening of the lower cell/element of column is produced on the tooth whose size/dimensions are regulated (height 0.57 m, the bearing surface 0.2x0.25 m and 0.3x0.3 m respectively for columns by section/cut to 0.6x1.0 m is more than).

For the elimination of possible errors, supporting unit on the section of tooth is assembled in one piece after the fitting of the superincumbent field dry joint.

The reinforced-concrete cell/elements of columns are made from concrete of brand 500. The weakening of section/cut by trimmings in the place of dry it is butting it is compensated for by indirect reinforcement by steel meshes.

Cross bars in the buildings of thermo-electric powers station, as in multistage production buildings, they are divide/marked off into two groups: with packing of the plate/slabs of overlap into flanges and for face side. Cross bars with flanges for packing the plate/slabs are applied in auxiliary buildings and constructions with

the grid of columns 6x6 m. The section/cut of cross bars 0.4x0.6 m and 0.4x0.8 m; flanges 0.15 m in wide are arrange/located on height by 0.25 m of face side from the calculation of packing plate/slabs 0.3 m in height.

The cross bars of rectangular cross section are calculated for the perception of large concentrated loads. They are applied in the framework/bodies of main housings. The section/cut of the cross bars of this group is united with the assortment of columns, on the basis of their concreting in common/general/total general-purpose forms.

Cross bar is establish/installed on the arm of columns. The rigidity of frame unit is achieved by the tank welding of the issues of reinforcement, arrange/located in cross bars up to 1.2 m in height in upper zone, and more than 1.2 m - partially and in lower zone with the subsequent monolithization of trimmings and clearance between the end/face of cross bar and the column.

Spacers are developed for longitudinal frame systems and are adapted to rigid and hinge fitting to columns. With the step/pitch of columns 6 m, are applied the spacers of rectangular cross section by size/dimension 0.3x0.4 m and 0.3x0.6 m, with step/pitch 12 m - a double-T section/cut by size/dimension 0.4x0.8 m.

For fastening of spacers in columns, remain three series of holes. Two Lower series serve for the adjustment of steel stands. Stand consists of the vertical sheet with fin/edge, propped against column, and the horizontal sheet, welded to fin/edge and the bolsters, passed through holes. An upper series of the holes of column is intended for the bolsters, weldable with the issues of the reinforcement of spacers, moreover for the hinged attachment of spacers bolsters only are cranked up at the depth of 250 mm, and for rigid - they are passed right through. Rigid joint enters into work after the monolithization of the clearances of joint.

Steel or reinforced-concrete crane beams are establish/installed on the arm of columns. Their constructions are analogous described below.

Sheet 26. Standardized cell/elements of bin-deaerating stand.

Besides the cell/elements of framework/body, examined above, here can be referred the cell/elements of overlaps and equipment. The flooring of overlaps consist of the resting on cross bars beams of rectangular cross section, of ribbed slabs and packed in their groove/slots finishing assembly flat/plane plate/slabs up to 3 m in long. Height of beams and longitudinal fin/edges of plate/slabs 0.4 m with step/pitch of columns 6 m and 0.6 m with the step/pitch of

columns 12 mm.

Beams and ribbed slabs are fulfilled from concrete of brand 300 and 400 with the stressed reinforcement. Finishing assembly flat/plane plate/slabs are manufactured from concrete of brand 200 and 300 and are reinforced by grids.

Beams place to cross bars without attachment on supports at the length of bearing section not less than 175 mm.

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The supporting/reference faces of ribbed slabs also do not have laying parts. They are fastened by the means of the monolithizedd in the longitudinal seams reinforcing cages, connected with the issues of reinforcement from cross bars.

Small apertures for technological equipment are arranged in floors by cutting of the flanges of the plate/slabs (permissible limits of cuts are shown by dotted line on their images). Large apertures are formed by the breakage between the basic cell/elements of flooring, partially filled with finishing plate/slabs.

Suspension to the overlap of technological equipment is produced

on steel belts with threaded/cut knot/caps and the welded-on washers, brought into the longitudinal seams between ribs of plate/slabs.

The outside sections of overlaps are formed by plate/slabs 1.5 m in wide, which rest by the means of steel brackets on closest cantilever of columns. Along the open in hall locations sides are establish/installed steel enclosure/protections.

Hoppers for carbon consist of the steel funnel, establish/installed to the steel H-beams, which rest on cross bars, and the arranged/located above it reinforced-concrete jar. Bank it is assembled from the S-shaped panels, connected by loop joints.

Sheet 27. Trusses Used in Coverings of Main Housings.

The flight/spans of the machine and boiler room of the halls of main housings are multiple to module/modulus in 3 m and differ from those standardized. Trusses intended for the overlap of these flight/spans, must be installed from the shipping mark/brands, convenient for transport by rail transport.

At present flight/spans to 36 m overlap with steel polygonal farm/trusses, and sometimes - by reinforced-concrete block Vierendeel trusses, flight/spans into 39 and 45 m - by the lightened steel

farm/trusses with rigid upper belt/zone.

Steel polygonal farm/trusses are analogous by standardized, shown in fifth chapter.

The lightened steel farm/trusses with welded upper belt/zone consist of the separate shipping mark/brands, enlarged into the farm/truss before the assembly. This makes it possible to designate the optimum height of farm/trusses independent of the dimensions of rail transport.

Upper flange consists of three rigid through cell/elements. It is connected with lower strip by the rarefied grate from the belts, connected in the middle of cell/elements, and of rigid through struts and suspensions, connected in their joints. The support of the plate/slabs of the flooring of the coating from 1.5 m in width is produced in the units of the upper belt/zone of through rigid cell/elements independent of knots of a truss.

The geometric circuit of the lightened farm/trusses is selected with consideration of the use of internal effort/forces for the extinction of local bending. The decrease of effort/forces, and means and the section/cuts of cell/elements, and reduction in their number in grate and communication/connections makes it possible to lower the

overall consumption of steel to the lightened farm/trusses approximately to 26o/o relative to common polygonal farm/trusses.

The lightened steel farm/truss with rigid upper belt/zone is developed at institute Teploelektroproyekt; the authors - engineers I. G. Raskin, M. V. Rubinshteyn and A. I. Ponomareva.

Reinforced-concrete block Vierendeel trusses are applied since 1962 by the Sevenergomontazh Trust. For entire cross bracing, is manufactured 6 blocks with a length of 3; 6; 9 and 12 m with the section/cut of belt/zones 0.24x0.32 m for flight/spans to 30 m and 0.27x0.4 m - for flight/spans 33 and 36 m. Fermat by flight/span 24 m is comprised of two 12-meter blocks, in the remaining cases - from two outer 12-meter blocks with the appropriate insets. The joint of upper belt/zone is fulfilled with the steel packing, welded to the laying of elements of blocks, the joint of lower belt/zone - by the tank welding of the issues of reinforcement and subsequent monolithization.

The blocks of Vierendeel trusses are simple in manufacture and are convenient for transport on railroad platforms. Along with that height of farm/trusses is limited by standard railroad dimension and does not correspond to the optimum version for this flight/span.

Joints on lower belt/zone are complex in the production of works, do not provide a sufficient resistance to cracks of construction and are sensitive to welding defects. Therefore the described system will receive the limited propagation.

In mass building are applied reinforced-concrete girders by flight/span to 30 m with monolithic belt/zones and grate from laying cell/elements.

Sheet 28. Wall panels.

In the main housings of thermo-electric powers station, are applied the 12-meter wall panels having a number of designs analogous to 6-meter panels in the buildings of mass building. Using material and by construction of panel, are subdivided into the light-concrete and reinforced-cement, on site of installation, - row, lintel, and parapet.

Lintel panels are placed on top and bottom of window apertures. They differ from Privates in terms of intensive reinforcement and the presence of laying parts for welding of the imposts of steel interlacings. Parapet panels have laying parts for fastening to [illegible] and packings of finishing plate/slats.

In the ground level of panel, they are establish/installed to foundation beams, and above - to each other. The lintel panels above apertures and the series panels through the specific intervals on the anechoic sections of walls rest on the welded-on to columns arms. All panels are linked with columns by flexible anchors.

Nominal altitude of panels 1.2 and 1.8 m, thickness - 0.25 and 0.3 m. Thickness of the side seam 15 mm, vertical - 30 mm. External faces are edged by facet/bevel 15x15 mm. emphasizing in facade line of weld. In the angles of the buildings of panel, are supplemented by finishing light concrete blocks with section/cut 0.25x0.25 m, welded before the assembly.

Light-concrete panels are fulfilled from cellular/honeycomb autoclave concrete, cellular concrete and cellular concrete of brand 75 in approximately 850 kg/m³ specific weight and keramzit concretes of brand 50 and 75 by specific weight approximately 1000 kg/m³. Finned type reinforced concrete panels with flange 10 mm in thickness and fin/edges 300 mm in high are molded from fire-grained cement-sand concrete of brand 400 and are reinforced by the woven steel grids, connected with framework/body.

Over the external surface dross and porous concrete panels, is arranged 35-mm facing layer from the heavy-aggregate concrete of

board 200. Internal surface is cover/coated with coloring of steam insulation. The surface of keramzit-concrete panels in three-layer version is shielded by a 40-millimeter layer of dense keramzit concrete in approximately 1800 kg/m³ specific weight.

Reinforced-cement panels are warmed by the matte finishes from staple fiberglass, stuck or fixed on caprone knob/buttons to inside of fin/edges and flanges. Steam insulation of matte finishes it is provided by oil coloration. For the protection of thermal insulation on the fin/edges of panels, are stuck the reinforced-cement sheets, which form smooth internal surface.

Fastening panels to the columns of framework/body allow/assumes small vertical displacement/movements. It is done with bolts attached in the angles of panels and passed through holes in the flange of the angle iron, welded to laying elements of column. Filling of welds is analogous to that used within the walls of the buildings of general purpose.

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Chapter 4.

BUILDINGS OF HYDROELECTRIC POWER PLANTS.

The buildings of hydroelectric power plants are raised on individual projects, since their schematic diagram, construction and equipment are tightly connected with geology of the place of erection and hydrological conditions of river.

The diversity of local natural conditions limits the possibility of the unification of hydraulic engineering building. Known typification is reached by the selection of the representative hydroelectric power plants, the diagram and construction of which are characteristic for the group of the objects of long-range plan. The design of representative power stations is conducted with the calculation of the unification of equipment within groups and the typification of the constructions of prefabrication.

Composite constructions are applied the parts of the buildings and constructions, not receiving water head. Here their application/use accelerates periods and is decreased the cost of building. For example, application/use of the composite prestressed reinforced concrete makes it possible to finish the construction of machine room before the launching/starting of aggregate/units and to avoid the device of time/temporary tent. A quantity of typical dimensions of the composite constructions of the building of hydroelectric power plant to high degree depends on the selection of the size/dimensions of underwater part. Length and the width of section must be designated taking into account the application/use of a grid of the center lines of superstructure, multiple to the amalgamated module/modulus 6 m. For example, in the building of near-dam hydroelectric power plant with units power 500 MW (sheets 35-38) the length of section 60 m; the step/pitch of columns 60: 5=12 m; flight/span 30.9 m is led to 30 m by joining "450". As a result in superstructure, can be used the standardized trusses, flooring slabs, wall and window panels. On the contrary, in the building of riverbed low-pressure hydroelectric power plant with aggregate/units 100 MW in power (sheet 32) the length of section 54.5 m; the step/pitch of columns 54.5:5=10.9 m; flight/span 24.4 m. The decrease of the length of section only on 0.5 m and span on 0.4 m would make it possible to pass to 6-meter step/pitch and to use the standardized constructions.

The constructions, receiving water head and large concentrated loads, are performed composite monolithic. In these constructions of the plane of the concreted unit, limit the composite reinforced-concrete plate/slabs and the panels, which include basic fitting.

The massive and nonrecurring constructions are performed monolithically. Their planking is hung to the carrying reinforced-framework/bodies, calculated by weight of damp/crude concrete.

The contemporary methods of application of composite and heterogeneous-monolithic constructions are illustrated by the drawings of sections and aggregate units of the buildings of the hydroelectric power plants of different power.

Sheet 29. Section of the building of the riverbed combined low-pressure hydroelectric power plant with capsular aggregate/units 15 MW in power.

The building of hydroelectric power plant consists of five sections 53 m in long each, divided by bull calves into four aggregate units. In the socket of aggregate unit, is establish/installed capsular hydroaggregate 15.5 MW in power. The

drop-like capsule of aggregate/unit is leaned to two radial mountings, it is braced by six braces and it is connected by access with the electrotechnical corridor.

Water jet, passing between bull calves, flows about the capsule and through the blades of the stator of turbine and guiding device falls on propeller blade. Discharge water is abstract/removed along the suction duct, arrange/located on the axle/axis of hydroaggregate. Water outlets are located above turbines and are separated from them by removable steel overlaps.

The direct-jet motion of water reduces to the minimum of the loss of hydraulic power, which completely is substantial in pressure head the low stations. The application/use of capsular hydroaggregates eliminates the installations of locations of shield department/separation and machine room. The inherent in them functions (displacement of panels and the assembly of hydroaggregates) are accomplished by the gantry crane under the open sky, but inspection and routine repair of generators are performed in capsules.

The building of hydroelectric power plant is based on monolithic base plate. It consists of the bull calves, united into three-dimensional/space construction by the locations of the

electrotechnical corridors, by the overlaps of the suction ducts, visor, crane and bridge beams.

Constructions, arrange/located higher than base plate, in a series of the cases composite monolithic.

The surfaces of piers, half-piers and walls of the electrotechnical corridors on individual sections are formed by reinforced-concrete panels up to 25 t. in weight, by section/cut in the form double "T", by the connected loop joints. Panels include the working fittings, which ensures the strength of construction, and their assembly in essence eliminates the device of planking and the setting up of reinforced-constructions.

The composite prestressed reinforced-concrete beams are packed in the overlaps of the decks of hydroelectric power plant and bridge transitions. They make it possible to forego the horizontal planking of concrete blocks and its supporting scaffoldings.

In groove/slots for gates, are establish/installed channel type composite cell/elements, the including laying parts. By this is simplified the assembly of groove constructions and are eliminated the labor-consuming processes of the concreting of batters.

The series of elements, which do not experience/test pressure water, is made from the precast reinforced concrete. Such cell/elements include visor beams, the crane beams, the beams of bridge transitions, plate/slab of overlaps and other parts of the building where the application/use of the previously prefabricated articles accelerates construction, without decreasing the solidity of framework/body.

The typification of composite constructions is conducted for a series of the cascade/stage stations. The manufacturing plant of the precast reinforced concrete is furnished at river and is utilized river transport for the delivery/procurement of articles.

Sheet. 30. Section of the building of the riverbed combined hydroelectric power plant of average pressure head with aggregate/units 85 MW in power.

The hydroelectric power plant in question according to the character of operation "is peak" - intended for short-term electric energy generation into watches "peak" because of the use of water supplies, accumulated in the course twenty-four hours. It consists of two sections on five aggregate units. Aggregate units are placed between basic bull calves 3 m in wide, arrange/located with interval 15 m. 15-meter flight/span is divided from the side of the

entrance into volute chamber by two, and in the suction duct - by one intermediate pier.

Machine room together with the adjacent it from the side of the lower reach electrotechnical corridors is arrange/located under spillway and it is separated from the side of the headwater by forcing wall. The massive enclosure/protections of machine room, which convert below into volute chambers and suction ducts, they pierce across flow entire station and connect its framework into the monolithic three-dimensional/space construction, cut in middle by deformation weld.

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Surfaces of piers, half-piers, the volute chambers of forcing wall and walls of the electrotechnical corridors in essence are formed by reinforced-panels. Groove/slots for gates are made from channel type composite cell/elements.

In the overlaps of building, are used uniform composite reinforced-concrete plate/slabs by section/cut in the form of double "T", long to 12 m. The 18-meter flight/span of machine room overlaps by them on the paired reinforced-concrete drive/girders with composite shell of the cell/elements of L-shaped section/cut. In the

overlaps of the suction ducts and spillway, these plate/slabs are packed by flange downward, forming "vessels" for the massive assembling in one piece layer, while in floors - by a flange upward, forming basis/base under hems.

Crane cantilevers of machine room are made from the composite reinforced-concrete cell/elements of rectangular cross section, connected by the issues of fittings with the array of walls.

The arranged/located before the forcing wall of machine room visor beam, with the exception/elimination of the monolithic of basis/base and end, is collected from the composite cell/elements of double-T section/cut. Railroad and crane tracks are packed on the composite prestressed reinforced-concrete beams.

As a whole the building of hydroelectric power plant in question shows that and with the complex configuration of framework the widest possible application of composite monolithic constructions with the minimum number of typical dimensions of reinforced-concrete articles.

Sheet 31. Aggregate unit of riverbed low-pressure hydroelectric power plant with units 10 MW in power.

The building of hydroelectric power plant consists of two

sections, in one of which are placed two aggregate units, and into another - one aggregate unit and the floodgate, above which is arrange/located the fitting bay. Superstructure of building in the composition of shield department/separation and machine room provides the normal operation of aggregate/units under the climatic conditions of north.

As a result of a small recurrence of cell/elements, the underwater part of the building of hydroelectric power plant is carried out in essence in monolithic reinforced concrete. Composite T-beams form the "vessels" of the composite monolithic overlap of the suction ducts and the flooring of area/sites at the level of the top of the groove constructions of the lower reach. There, at the level of volute chambers in concrete array, included drainage device in the form of register from perforated asbestos cement pipes, which assembles the filtering through hydraulic engineering concrete water.

The grid of the center lines of the columns of superstructure 8.7x(10.2+16.1) m and crane load 50/5 and 100.20 t are close to those accepted for the standardized constructions. In connection with this the composite reinforced-concrete cell/elements of framework/body and enclosure/protections - two-leg columns, the crane beams, two-slope surface and lean-to rafter beams, wall panels, finned flooring slabs and their assembling units are analogous to cell/elements and the

units, used in the single-stage industrial buildings of general purpose, with the exception/elimination of the described below parts.

The joint of columns with not glass, but open type concrete array, with welding of the issues of reinforcement and concreting within the limits of supporting tooth to larger degree provides the rigidity of connection of the formed by framework/body transverse and longitudinal frames. The cross bars of longitudinal frames form the rigidly connected to columns braking beams, arrange/located in the level of crane runways and connected with the crane beams by welding laying cell/elements on the faces of flanges. Frames absorb affecting superstructure increased wind and braking efforts.

The complication of the configuration of the columns of medium series escape/ensues from the need for placing arms for the crane beams at different levels. The panels of the wall between the shield location and the machine to begin to break, that are strengthened to these columns, are cranked up into ring from the channel bars, welded to the laying cell/elements of interleg spacers.

Wall panels are keramzit-concrete. Window panels glass-reinforced-concrete - from the glass blocks, connected by reinforcing grid and solution/opening during nonshrinking cement, inserted into the reinforced-concrete framework with the cushions.

fastening wall and window panels to extreme columns is hidden in weld throat and it is movable within the limits, which allow/assume the temperature-expansion strains of walls.

The examined building is an example of the attachment of articles and design concept, accepted in the single-stage industrial buildings of general purpose, for the special feature/peculiarities of superstructure of hydroelectric power plant.

Sheet 32. Aggregate unit of riverbed low-pressure hydroelectric power plant with aggregate/units 100 MW in power.

The building of hydroelectric power plant consists of five sections 54.5 m in long, on two aggregate units of each. Station not not combined - discharge/break is flood through the reinforced-concrete spill-way.

At the base of building, lie/rests monolithic base plate. On it from the side of the headwater in shield department/separation, are furnished two half-piers along the edges of section even three intermediate piers, half-piers and average pier transfer/convert into the walls of volute chamber, whence water falls into the suction ducts, divided by the same quantity of piers.

It is above, from the side of the headwater, across flow passes the forcing monolithic wall of machine room, which forms together with the piers of shield department/separation the three-dimensional/space construction of framework. Above the volute chambers are placed the reinforced-concrete beaker/sleeves, which accomodate hydroaggregates; above the suction ducts - three-storied electrotechnical corridors. The coating of the corridors forms area/site for the open setting up of transformers. Machine room - island type with the sex/floor, arrange/located at the level of bottom of beaker/sleeves, and by passes on their face side. The auxiliary equipment is establish/installed between beaker/sleeves and is not reduced dimension for the work of tap/crane.

the underwater part of the building is carried out in composite monolithic reinforced concrete with the application/use of composite cell/elements in overlaps and the facing of walls. the suction ducts are overlapped by the T-beams of different length, by weight to 10 t, volute chambers - by beams of the same airfoil/profile, and on small flight/spans - by flat/plane reinforced-plate/slabs. They form the overlap of loss. The electrotechnical corridors are overlapped by the ribbed slabs, packed on the arm of concrete array, and in the composite sections of transformer area/site - to the flanges of drive/girders by flight/span 8.7 m. Composite flooring is slabbed by the leveling layer of concrete. the facing of volute chambers and

walls of the underwater part of the building is made from reinforced-panels. crane ways and overbridges in the upper and lower reach they pass on the uniform composite reinforced-concrete prestressed beams.

Step/pitch of the basic columns of machine room 10.9 m. Rafter beams by flight/span 24.4 m are packed with step/pitch 5.45 m to frame-supporting drive/girder; on them - the ribbed slabs, which form the flooring of coating.

The deformation welds of superstructure coincide with intersectional welds and are performed on two columns. Basic columns are two-leg in crane and above-crane parts. Their cutting provides for the input/introduction into the operation of the bridge crane during the incomplete assembly of framework/body.

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The crane beams of tap/crane by load capacity 350 t - the prestressed reinforced-concrete composite 2.4 m in high, which hinged rest on columns by the means of steel balance beams. Fastening rails - on anchor bolts with the concrete dressing, reinforced by grids.

Silicate concrete wall and glass-block window panels 5.45 m in

long are fastened to basic and frame columns. Fastening hidden in weld throat and movable - allow/assuming the temperature-expansion strains of walls. The appearing in glass-block panels temperature effort/forces are compensated for by the cushion between the brace and the framework from vibrated silicalcite. Economic effect from the application/use of composite constructions in superstructure of building in this case is limited by the nonunitized size/dimensions of flight/span and step/pitch of columns and by the complicated construction of cell/elements and units in comparison with standard accepted solutions.

Sheet 33. Aggregate unit of near-dam hydroelectric power plant with units 225 MW in power.

Sheet 34. Cell/elements and the assembling units of superstructure.

The building of hydroelectric power plant consists of 20 aggregate units and two fitting bays. The common/general/total length of building is more than 500 m.

The base, which corresponds to the underwater part of the river-bed stations, is made from monolithic reinforced concrete with the application/use of composite T-beams in the overlaps of the suction ducts and ribbed slabs in between-floor overlaps and the

coating of the locations of electro- and fluid-mechanics equipment, which adjoin from the side of the lower reach.

Constructions of framework/body and enclosure/protections of the machine room, which occupies all the superstructure of building, reinforced-concrete composite. Columns are bifurcated in crane part to inclined cell/elements. The forming system of isosceles triangles with the step/pitch of apex/vertexes and of base 7.32 m in length rests on those increasing above hollow of machine room stumps and is closed on top by the crane beams. The vertical necks of columns are covered with the longitudinal cross bars, carrying the flooring of coating from t-shaped two-slope surface plate/slabs.

Each column is erected from two inclined and one vertical cell/elements, connected above the stump and in the level of the crane beam by the monolithic joints of complex configuration up to 2.5 m in high. the inclined cell/elements of columns are installed by means of steel of jigs.

The schematic of wall framework/body accepted provides without the setting up of additional constraints the longitudinal stability of building together with the fact it will entail the considerable overexpenditure of structural/design reinforced concrete, the additional typical dimensions of articles, complication it is butting

and an increase of the labor consumption of installation works within framework/body itself and the adjacent it panel walls.

The application/use of inclined columns can be substantiated in average series of the multispan buildings where it doubles or triples their step/pitch at the level of sex/floor with respect to the step/pitch of the supports of crane beams and rafter constructions. Inclined columns in extreme series of framework/body near the wall it is structural and are not economically justified.

At the same time in the constructions of superstructure in question there is a series of effective solutions. To them belong: the couplings of 6-meter glass-reinforced concrete panels with gathering pier, that make it possible to apply the standardized cell/elements of enclosure/protections with the nonunitized step/pitch of framework/body, characteristic for the buildings of the hydroelectric power plants: the pilot bridges with latticed flange, the improving conditions of exchange of air in machine room and the construction of coating.

T-shaped two-slope surface reinforced-concrete plate/slabs by flight/span 22.8 m, the which form flooring coatings, are concreted with the placed into forms prestressed lower part of the fin/edge, pre-manufactured on drawn-out bench by package method. The stability

of plate/slabs during assembly and the exial stiffness of flooring are provided by perpendicular to basic fin/edge fulcra.

To advantages of this type of coatings, can be referred: minimum quantity of typical dimensions and large size of articles, the successful architectural articulation of the ceiling of the extended halls; to shortcomings - an overexpenditure of structural/design concrete with respect to the standardized coatings. Flooring from analogous cell/elements were applied also in other large hydroelectric power plants.

The drawings in question illustrate the constructions of the building of near-dam hydroelectric power plant, realized in nature on by Bratsk the hydro-electric station of river hangars. Separate shortcomings in the framework/body of superstructure are noted as a result of the comparison of these constructions with the later and perfect solutions, carried out partially on the basis of an experiment in the design and building, accumulated as a result of the erection of Bratsk HEP.

Sheet. 35. Aggregate unit of near-dam hydroelectric power plant with the removed aggregate/unit 500 MW in power.

The building of hydroelectric power plant consists of 10

aggregate units and the fitting bay of common/general/total long 360 m. From the side of dam to the machine room abuts three-storied annex with locations for electrotechnical equipment. In the concrete array of the base of building, pass steel delivery pipes 7.5 m in diameter, which are united in pairs in front of the volute chamber, which supplies water to turbine.

The shrinkage and thermal strains of concrete array are compensated for by elastic insulating layer, which covers steel snail/volute.

From the bottom of beaker/sleeve, project supporting/reference stones with batters for the anchor bolts to which is established lower cross piece of unit. At the level of the overlap of the machine room the glass is thickened.

The intensive rim forms detents for the upper cross piece of aggregate/unit and external circular arm for the support of composite reinforced-concrete plate/slabs. The length of the section of superstructure 60 m the flight/span of machine room 30.9 m they make it possible to use for the columns of superstructure the standardized grid of the center lines 12 x 30 m.

Columns - the reinforced-concrete monolithic of t-beamed

section/cut with composite above-crane "neck". The crane beams - the steel split of double-T section/cut, 2.1 m by height, with additional stiffening ribs in upper zone. Crane load 500 t. The rigidly connected to columns reinforced-concrete beams of double-T section/cut (braking in the level of crane runways and spacer in the level of the support of farm/trusses) absorb horizontal effort/forces and provide the longitudinal stability of framework/body.

The coating of machine room is performed on the standardized steel farm/trusses (series PK-01-125) by reinforced-concrete ribbed slabs 3x12 m. To lower flange, is fastened suspension ceiling from the steel framework/body, filled with light acoustic plate/slabs.

Stained glass, which forms glazing walls, is carried out in aluminum framework/body from cells 3x1.9 m. At the level of the top of columns, the stained-glass panel is overlapped by parapet from light-concrete panels by size/dimension 1.2x12 m, decorated with removable screen made of corrugated stainless steel.

The application/use of the standardized cell/elements in coating and enclosure/protections of building is explained by the selection of the standardized grid of columns. At the same time known interest in academic sense represents the shown on the following sheets

version of framework/body and coating made of the nonunitized composite reinforced-concrete articles, the concluding series of the works conducted.

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36. Aggregate unit of near-dam hydroelectric power plant with units 500 MW in power.

37. Cell/elements and the assembling units of superstructure.

The reinforced-concrete version of the framework/body of the machine room of hydroelectric power plant is designed from composite two-leg columns with the t-beamed section/cut of shank, crane and braking beams and longitudinal cross bars, which rest on the ends of columns. To cross bars is established the flooring of the coating from T-shaped two-slope surface plate/slabs with flight/span 30 m.

Column is assembled from the tent and crane branches, divided by the vertical weld. Weight of cell/elements - to 33 t. Total weight of column 60 t. the setting up of column can be produced elementwise or once only after consolidation assembly depending on the load capacity of the erection equipment. Before the assembly those coupling surfaces are worked by blaster. Then to laying parts of one of the

branches are welded intermediaries from angle irons, who fix weld throat. The coupled surfaces are combined and are connected by welding intermediaries and issues of reinforcement. Joint is assembled in one piece by concrete of brand 300.

Joint of column with the base of building opened, finish concreted by concrete of brand 400 in the altitude limits of supporting teeth. The issues of reinforcement from hydraulic engineering concrete are established on steel template/pattern with direct joining to center lines and they must coincide precisely with the issues of the reinforcement of column.

The base plates of teeth are poured with toothing concrete. after setting up and adjustment of column, they are produced welding the issues of reinforcement butt with grooved block/backing and the concreting of joint under pressure concrete mass. The planking of the joint is made with funnels, and the level of the supply of concrete for the creation of pressure on 0.25 m exceeds the height of joint. The forming in funnels boss/inflows after hardening of concrete are felled.

The crane beam of double-T section/cut 2.1 m in high with the widened upper flange has the biaxial reduction, made lengthwise by the stretched beams of high-strength reinforcement, and in vertical -

by the stretched clamps. Beam is molded from concrete of brand 500.

During setting up the crane beam is supplied to the end of crane branch with welded-on upper and connected on time/temporary clamps chairs. The setting up of chairs is adjusted on straightening nuts, after which they are poured with toothing concrete.

The braking beam of the double-T section/cut with a height of 1 m strengthens upper to the flange of crane tanks for the perception of braking efforts, developed in the work of tap/crane in longitudinal and transverse directions. It is rigidly connected to the tent branch of column by the tank welding of the issues of reinforcement and by monolithization is butting and it is connected with the upper flange of the crane beam by welding the laying cell/elements through the diaphragms, arrange/located in weld.

The longitudinal cross bars of double-T section/cut and t-shaped two-slope surface plate/slabs are reinforced by the beams of high-strength wire, they are molded from concrete of brand 500 and are established on the supporting/reference sheets, slipped over anchor bolts. The flanges of plate/slabs are connected by welding the laying cell/elements through diaphragm with the subsequent monolithization it is butting.

The maximally loaded by the effective effort/forces, uniform in material and system reinforced-concrete "linear" cell/elements of framework/body and coating are carried out in the successfully obtained proportional forms. They create the impressing architectural appearance of interior, entering the best classical traditions and which corresponds to the power of contemporary energy machines.

Sheet 38. Cell/elements of the overlap and of the coating of machine room.

Covering of machine room absorbs large loads - concentrated constants and time/temporary from the established/installed equipment and the units of the periodically dismantled aggregate/units and dynamic instantaneous, developed with the emergencies of machines. In the given above buildings of the hydroelectric power plants of the overlap of machine room, are carried out in monolithic or composite monolithic reinforced concrete. On the sheet in question shown heterogeneous-monolithic overlap of machine room with units 500 MW in power.

The free flight/span of machine room is divided into four approximately equal to part. Along the dividing them axle/axes are arrange/located the reinforced-concrete pylons, connected with the beaker/sleeves of hydroaggregates, and column by section/cut 0.6x0.6

m, separate or paired of deformation welds.

On pylons and columns, pass cross bams as flight/span to 6.5 m and as section/cut 0.56x0.9 m by flanges for packing the plate/slabs. Flcoring from flat/plane plate/slabs by flight/span to 8.4 m and by section/cut 1.5x0.25 m forms the "vessels" cf flooring slab. All plate/slabs of flooring are manufactured in one form with different insert/bushings and are reinforced by the produced upward framework/bodies.

The overlap is made in one piece with the layer of concrete 0.25 m in thickness, reinforced in upper zone by grid from steel rods. Grid is packed above the issues of reinforcement from composite plate/slabs. on sections with hatches and in the points of the intersection of overlap with the cclumns of basic framework/body the plate/slab is monolithic to entire thickness.

In upper part the sheet are shown the cell/elements of flooring frcm the t-shaped two-slope surface plate/slabs, led to the grid of columns 9x24 and 12x30 m. Coatings from similar cell/elements are used in the largest buildings of hydroelectric power plants, constructed into 1958-1965.

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Chapter 5. Standardized ~~cell~~/elements of the framework~~/body~~ of the single-story buildings.

The economic advisability of applying the standardized composite reinforced-concrete cell/elements in the majority country of our regions is limited to the following parameters: the height of buildings to 18 m, flight/span to 30 m, crane load to 50 t. These parameters demarcate the effective series of reinforced-concrete and steel constructions, which are the basic content of the corresponding sheets. The data on the reinforced-concrete articles, which emerge beyond the limits indicated, are instituted on experimental works. The possibility of their use in academic or real design must be accompanied by the appropriate economic substantiation.

Steel framework/bodies are applied for the buildings, equipped with supporting/reference tap/cranes by the load capacity of more than 50 t. They consist of two-leg columns, the crane beams and farm/trusses by flight/span 24 m and more. Sometimes the cell/elements of the steel framework/body are combined with cell/elements from the precast reinforced concrete, relying on the latter. For example, steel farm/trusses and the crane beams are

established to reinforced-concrete columns, columns themselves are assembled from reinforced-concrete crane and steel above-crane parts, etc. The support of more massive reinforced-concrete cell/elements to steel unconstructively and in practice is not encountered.

Sheet 39. Foundations with glass type bases.

Composite reinforced-concrete foundations with glass type bases are designed under reinforced-concrete columns with the section/cut of shank from 0.4x0.4 m to 0.6x1.9 m for soils with standard pressure from 1.5 kg/cm². They consist of base with beaker/sleeve for the setting up of column and the which develops bottom composite or monolithic base plate. In the composite version the area of bottom can be led to 27 m², in monolithic - to 54 m². The latter makes it possible to transfer normal effort/forces of approximately 500 t to soil with minimum standard pressure.

Composite base plates are packed to natural soil on the leveling layer of sand, packed then by vibration. The concreting of monolithic plate/slab is produced on the rammed into soil layer of crushed stone, gravel or concrete preparation 0.1 m in thickness. Base is established to plate/slab on the layer of cement-sand solution.

In the presence of the bending moments, the joint is

strengthened by welding laying cell/elements. Welding point is covered with shielding concrete. Column is assembled in one piece in the beaker/sleeve of base. Beaker/sleeves for two-leg columns are designed common/general/total for both branches.

The composite cell/elements of foundations up to 12 t in weight are manufactured at the plants of reinforced-concrete articles, by weight to 21t - on range/polygons. The bases of eight basic types differ from each other in terms of the size/dimensions of ends and bases. Each type has 3-4 gradations on height (1.2 m only under the columns of rectangular cross section, 1.5, 2.1 and 2.7 m). The section/cut of beaker/sleeves on top on 0.15 m, but low is 0.05 m more than the section/cut of columns; bottom on 0.05-0.15 m lower than the depth of framing. Columns are established to adjusted on level concreting of the bottom of beaker/sleeves.

The mark of the laying of foundations is determined by the depth of freezing and by other conditions of the ground. In the assortment in question it can vary itself from -1.35 to -3.75 m. The top of base corresponds to the level of the adjacent the building earth/ground (-0.15 m).

On the perimeter of the building between bases, are established the foundation beams, forming base for walls. They T-beamed

section/cut, by height 0.4 m, with width flanges from 0.3 to 0.52 m (according to the thickness of wall), rest on additional boss/inflows or "chilled" by cement-sand mortar reinforced-concrete struts with on top of mark -0.45 m. On tanks is packed the moisture-proof layer of cement-sand mortar 30 mm in thickness.

From face the top of foundation beams, abuts the blind area - inclined asphalted plane, which discharges the surface water: from inside - sex/floor of the first deck. In heated buildings the foundation beams are warmed by filling of slag at depth 0.5-0.7 m.

In a number of cases, appears the need for the individual design of foundations, for example under paired columns, under columns by section/cut it is more 0.6x1.9 m, under steel columns, etc.

Under the paired columns, placed near deformation welds and differentials of heights, are established monolithic foundations with separate beaker/sleeves. The distinctiveness of beaker/sleeves simplifies assembly and raises the strength of the framing of the paired columns. The possibility of the device of dividing wall is provided for by the size/dimensions of insets and displacement from the center lines (see sheet 2). During sufficient recurrence and the mentioned limitations in weight, here also can be used the foundations from composite cell/elements.

Foundations under the reinforced-concrete columns of large cross section are performed analogously or with hemp type bases (see sheet 23). Steel columns are established to monolithic stepped foundations and are fastened to them on the anchor bolts (see sheet 47).

Sheet 40. Reinforced-concrete columns of rectangular cross section.

Sheet 41. Two-leg reinforced-concrete columns.

The standardized reinforced-concrete columns, shown on the sheets in question, are intended for the single-story buildings with the grid of center lines to 12x36 m, cockless and with supporting/reference tap/cranes by load capacity to 50 t.

The columns of rectangular cross section (series KE-01-49) are applied in cockless buildings up to 9.6 m in high and in buildings up to 10.8 m in high with supporting/reference tap/cranes by load capacity to 20 t. In buildings up to 18 m in high with supporting/reference tap/cranes by load capacity 30-50 t the crane part of the columns is two-leg (series KE-01-52). Branches are connected by the horizontal spacers through the interval of 1.5-3 m.

On the position in the building of column, they are subdivided into extreme and average. Tc extreme columns frcm face, abut wall enclosure/protections. Extreme columns, in turn, are divided into basic, receiving loads from walls, tap/cranes and the constructions of coating, and frame - employees cnly for fastening of walls. The frame columns (see sheet 42) they are established in the end/faces of building and between basic columns of longitudinal walls with the step/pitch of basic columns 12 m and 6-meter wall panels. In a series are separated the connected columns, connected by steel vertical communication/connections fcr the perception of horizontal forces.

Columns are reinforced by welded or knitted framework/bodies and are molded from concrete of brand 200 during rectangular cross section, brands 300-400 - two-leg. The laying cell/elements, anchored to concrete or the welded-on for fixation positions to working reinforcement, are in all columns in the places of the support of rafter constructions and crane beams, in extreme columns - at the level of the welds of wall panels, in connected columns - in the places of the contiguity of longitudinal communication/connections. Flushing steel tubes 50-70 mm in diameter form the holes, utilized for slinging during the removal of the molds and the assembly.

Laying cell/elements of the places of the support of the crane beams and rafter constructicns consist of steel plate with the passed

through it anchor bolts. Concrete hearth by them is strengthened by indirect reinforcement by grids. For the setting up of frame-supporting farm/trusses, the ends of columns descend on 0.7 m and are performed by the Be of anchor bolts. Joint is realize/accomplished by a ceiling joint weld. With steel farm/trusses and the crane beams, the laying cell/elements are somewhat modified - sheet it is strengthened by the plate/slab, calculated to the concentrated pressure fulcra, and is changed the arrangement of anchor bolts. Steel frame-supporting farm/trusses are fastened to steel patellas (see sheets 48-50).

For joint with foundation, the column is cranked up into beaker/sleeve at depth to 0.85 m during rectangular cross section and to 1.20 m - with two-leg.

Within these limits for communication/connection with concrete of monolithization, the shank of column is equipped with horizontal grooves. In two-leg columns lower spacer 0.2 m in high, cranked up into beaker/sleeve, has holes 0.2x0.2 m utilized with the concreting of joint.

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During further perfection/improvement of construction, it is

expedient the lower spacer to drop/omit on the bottom of beaker/sleeve for the best framing and convenience of the concreting of joint.

The setting up of columns is performed by self-propelled cranes. To lift dew the column is connected by the inserted into holes for slinging captures. For time/temporary fastening and the straightening of columns, are applied the adjustable above the beaker/sleeve steel conductors with hand jacks or wedging of shank in beaker/sleeve and the brace of end by inventory attachments. The instrument/tool adjustment of columns is produced in two directions on the risks, plotted/applied on their surface. The joints of monolithization it will collect 70o/o of calculated strength.

Two-leg reinforced-concrete columns for buildings up to 19.8 m in high with supporting/reference tap/cranes by load capacity 75-125 t are developed in the volume of technical solutions by the design institute No. 1 All-Union association of Soyuzmashproyekt.

The advisability of application of these columns is determined by specific conditions.

Unlike the standardized two-leg columns in this case, are provided for: the possibility of the sinking of underground part to

-5.6 m with the foundations of the deep laying: assembly of two-three cell/elements and the device of passes 0.4 m in wide in above-crane part of the columns, adjustable in buildings of heavy duty with passes on crane ways. The joints of assembling cell/elements are furnished in the lower and upper component/link of above-grade two-leg part. Lower joint is arranged in all sunk columns, since the setting up of stumps is included in zero, connected with earthwork, cycle. Upper joint limits length and the weight of installation cell/elements in connection with standard railroad dimensions and the load capacity of erecting cranes. Construction is butting "dry" - the branch of columns they are connected by the tank welding of the issues of reinforcement.

Sheet 42. Frame reinforced-concrete columns.

The standardized frame columns (series ~~kOe~~ KE-01-55) are developed taking into account the use of forms of the basic columns of single-stage industrial buildings on series ~~kOe~~ KE-01-49 and ~~kOe~~ KE-01-52. On the position in building, they are subdivided into the columns of end-type and longitudinal framework.

The design diagram of frame columns provides for their rigid framing at the level of the top of foundation and hinged support on top to the disk of flooring slabs or the adjustable in end/faces

buildings horizontal leg farm/trusses.

The columns of end-type framework absorb leg load and the weight of filling of walls. All them are made from reinforced-concrete cell/elements with steel extensions and nozzles. The reinforced-concrete cell/elements, arranged/located within production locations up to 12.6 m in high - rectangular cross section, are more than - two-leg. The ends of reinforced-concrete cell/elements are furnished below the ends of basic columns by 0.1 m in the first and 0.5 m - in the second case. This displacement creates the necessary clearance between the columns of end-type framework and lower web of rafter constructions.

In the height limits of the constructions of coating, the column of end-type framework is lengthened by the steel extension of double-T section/cut, welded to the laying plate/slab of reinforced-concrete end. Steel extension does not reach on 0.1-0.3 m the flooring slabs and in the altitude limits of the parapet is continued by cap/filling from the rolling angle iron whose flange it is cranked up into the vertical weld between parapet panels. Thus the columns of end-type framework they are continued to entire height of end-type walls and do not intersect with the constructions of coating.

The columns of longitudinal framework are furnished between basic columns with the 12-meter step/pitch of last/latter for fastening 6-meter wall panels. By loads, design diagram and construction, they are analogous to the columns of end-type framework. These columns do not intersect with the constructions of coating, and the ends of their reinforced-concrete cell/elements can be furnished at the level of the ends of basic columns or be continued to flooring slabs.

At the height of locations to 4.2 m, frame columns are made from steel rolled sections; from 4.8 to 9.6 m - with the reinforced-concrete cell/elements of rectangular cross section, concreted in the forms of basic columns on series kOe-01-49; 10.8 and 12.6 m - with reinforced-concrete cell/elements by section/cut 0.4x0.6 by m, concreted in special forms; from 14.4 to 18 m, - with two-leg reinforced-concrete cell/elements, concreted in the forms of basic columns on series ~~kOe~~ KE-01-52.

In the basic framework/body of pavilion buildings with locations from 10.8 to 18 m in high, flight/span d of 36 m, equipped with single-beam suspension tap/cranes, are applied two-leg reinforced-concrete columns (series KE-01-56). The casing size/dimensions of extreme columns correspond to series KE- 01-52. Average columns differ from the extreme central position of neck.

Thus, all varieties of the reinforced-concrete columns, used in the standardized single-story buildings, are manufactured in limited set of general-purpose forms.

Sheet 43. Reinforced-concrete rafter beams and frame-supporting constructions.

Sheet 44. Reinforced-concrete trusses.

All the constructions, carrying coating, are subdivided into rafter and frame-supporting. Rafter constructions overlap flight/span and similar to rafters directly support the flooring of roofing. Frame-supporting constructions overlap the 12-meter step/pitch of columns and form inner bearings for the arranged/located with 6-meter step/pitch rafter constructions.

By the diagram of the perception of external and according to distribution of internal effort/forces, these constructions are subdivided into beams and farm/trusses.

Beam - single-element construction, charged on entire flight/span. The bending moments cause in its section/cuts the

polysemantic normal effort/forces, which increase to outermost fibers.

Fermat - compound/composite rod construction, charged only into connecting rods units. junction/unit load causes single-valued normal effort/forces in rods and makes it possible to completely utilize their section/cut. The dead weight of farm/truss is 1.5-2 times smaller than the weight of beam with approximately reverse relationship/ratios on height in the middle of the span. Thus, the material which save during framework, is partially expend/consumed on its building around walls and the complicated configuration of sloping roofing.

The standardized reinforced concrete beams are applied in the coatings with flight/span to 18 m. The step/pitch of rafter beams 6 m, with the step/pitch of average columns 12 m rafter beams are established to frame-supporting beams. The standardized reinforced-concrete farm/trusses are applied in the coatings with flight/span 18-30 m. Step/pitch of trusses 6 and 12 m. With the step/pitch of average columns 12 m, the trusses with step/pitch 6 m are established to frame-supporting farm/trusses.

The configuration of the upper belt/zone of rafter constructions determines the configuration of roofing. For the flat/plane roofings

there are applied rafter constructions with horizontal upper belt/zone - farm/truss with parallel belt/zones, for sloping roofings - with the broken, inclined from middle upper area - segmented farm/trusses.

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For reduction in the number of internal drains in extreme flight/spans, can be establish/installed lean-to beams - with the slope of upper belt/zone to external wall. The trusses with horizontal and inclined upper belt/zones rest on the appropriate by it frame-supporting farm/trusses because of the different height of supporting units.

Rafter constructions absorb evenly distributed load from weight of coating and snow cover (550-850 kg/m² with flat and 350-550 kg/m³ with sloping roofings) and concentrated load from lantern farm/trusses and suspension tap/cranes. The bearing pressure, transferred by them on frame-supporting constructions, varies within 50-150 t.

The beams, which rest on the stands of frame-supporting beams, are shortened on 0.2 m. Farm/trusses with parallel belt/zones in the analogous case are performed without extreme struts and the panels of

upper belt/zone. With respect to the step/pitch of columns are somewhat shortened the frame-supporting farm/trusses, which adjoin the end-type walls and the deformation welds.

Rafter constructions are manufactured at the standard plants of the precast reinforced concrete. Everything they prestressed. Reinforcement of the lower belt/zone (reinforced drawing cruxes of periodic airfoil/profile, the bundles of jet, beams or twisted strands from high-strength wire) is tightened "to detents", "to concrete" or "to steel form".

During manufacture on broaching benches, tension of rod, string or stranded reinforcement is produced by jacks "to detents;", arrange/located in the ends of the bench at a distance of 100 m and more of the concreting of constructions. After the achievement by concrete 70o/o of calculated strength, the reinforcement between finished articles is cut.

Wire-rod bundle reinforcement is put through into the special channels of the achieved designed strength reinforced-concrete cell/elements and is stretched by jacks "to concrete". Channels for wire-rod bundle reinforcement are formed by the rubber hoses or tubular helixes from sheet strip steel. Channel shapers are fastened in reinforcing unit on the special framework/bodies, arrange/located

every 1 m, and they are recovered after concreting.

Beam is comprised from the rods, packed around the wire helixes, and it is reduced on ends by ring from plastic metal around threaded/cut core. The tension of beams is produced by jacks alternately and it is symmetrical relative to the axial plane of beam or farm/truss. The tightened beams are anchored in the packing blocks, then channels are injected by cement mortar under pressure to 6 atm.

The tension of rod reinforcement "to steel form" is performed in the majority of the cases by electrothermal method.

The concreting of constructions is produced in inventory steel planking. Concrete of brand 300-500 is packed by vibration.

Beams are concreted with bench technology in vertical position or prone in separate forms. After steaming and removal of the molds the beams are slung to rigid crosshead for the holes, bordered by steel tubes. Subsequently the holes in the walls of beams are utilized for the suspension of electric armature.

Farm/trusses are manufactured with monolithic belt/zones and laying grate. The prefabricated bars of grate are laid into the

arranged/located prone planking of belt/zones and are connected in units by the monolithization of the issues of reinforcement with concreting of belt/zones.

The dismantled farm/truss breaks away from pan/pallet by the lift of upper belt/zone to 0.25-0.5 m for the placed in it loops or tube. Then straps are passed through the units of upper belt/zone. Fermat is manipulated in vertical position and is set with storing to the bars, packed under supporting units.

With flooring from plate/slabs 1.5 m in wide, which have large bearing capacity, upper flange with parallel belt/zones additionally is reinforced for the perception of effort/forces from local bending.

Segmented farm/trusses are calculated to plate/slabs 3 and 1.5 m in wide. Their upper belt/zone has broken configuration with the straight portions between units. Gradient/draft of upper belt/zone within the width of lamp/canopies 1:12, on between-skylight sections to 1:3.5. Supporting units 0.8 m in high.

Before the setting up to the supporting units of rafter constructions, are welded supporting/reference sheets. Assembling fastening is produced on anchor bolts, then supporting/reference sheets are welded to the ends of columns. Frame-supporting beams and

farm/trusses are directly welded to the ends of columns by the overhead weld. Fastening rafter constructions to frame-supporting is analogous with fastening to columns.

The common/general/total stability of farm/trusses and coatings in the process of operating the building is provided by rigid disk of the monolithizedd flooring and by communication/connections. The ribbed slabs, which compose flooring, are welded to the laying cell/elements of upper flange not less than at three points each. For stabilization in the period of assembly, are establish/installed inventory assembling couplings, removed with welding of flooring slabs.

The carrier beams of the suspension single-beam tap/cranes are fastened on bolts to the rings from steel rolled stock, welded to laying cell/elements in the upper belt/zone of beams or in knots of a truss. For load distribution between knots of a truss in the lower part of the rings, are arrange/located reversing beams.

Sheet 45. Reinforced-concrete crane beams.

Reinforced-concrete crane beams are applied in buildings with supporting/reference tap/cranes by load capacity to 30 t with the step/pitch of basic columns of 6 and 12 m.

Beams - T-beamed section with the thickened on supports vertical wall, height from 0.8 to 1.4 m. They are reinforced by welded framework/bodies, and on lower belt/zone - one of the three forms of prestressed steel: by the reinforced by drawing cruxes of periodic airfoil/profile, by the bundle of jet of the high-strength wire of periodic airfoil/profile and by the strands, twisted from high-strength wire.

The crane beams in essence are manufactured on the drawn-out benches of long to 100 m and of more analogous with the beams rafter constructions. the stressed reinforcement is tightened to the detents, arrange/located in the ends of the bench, before the setting up of the framework/bodies of the unstressed reinforcement. Articles are divided by double diaphragms, between which is produced cutting of the stressed reinforcement, after concrete it will collect 70o/o of calculated strength.

At present for tap/cranes by load capacity to 30 t are developed the crane beams with the rod reinforcement, stretched by electrothermal method "to form".

Beams are molded from concrete of brand 300-500. The plane of

face side, which is subsequently base for the cushion, with concreting is aligned by vibrator rack.

On the place in the building of beam, are subdivided into the end-type - of end-type walls, Privates and temperature - of deformation welds. They differ from each other in terms of the presence and the arrangement of applied cell/elements. Laying plates are establish/installed in the places of support for columns and settings up of limit stops, tubes - into holes for fastening of rails and trolley.

The assembly of the crane beams is conducted by self-propelled tap/cranes. Captures are passed through holes for fastening of rails. during the setting up of beams, is allow/assumed the displacement of their axle/axes on 5 mm on vertical line and horizontal relative to the axle/axis crane rail with jump/drops to 2 mm in joints.

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Fastening the crane beam to the arm of column is produced on the anchor bolts, passed through the supporting/reference sheet, pre-welded to lower laying plate, and to the neck of column, - by welding vertical sheet to laying plates. Bolted joints after straightening are welded.

Rail in the form of welded lash to the length of temperature

section is packed on the cushion from a rubberized fabric of the type of the conveyer belts with a thickness of 8-10 mm from bilateral rubber facing and is fastened by conjugate clamps on cotter bolts. The joint of the rails above the deformation weld is reduced by the steel cover plates of figure airfoil/profile. In order to forego the use of rail tracks, are conducted at present experiments on the operation of tap/cranes by load capacity to 30 t on the cylinders with the pneumatic tires, which are moved directly on beams.

For preventing the possible ram by the tap/crane of end-type wall on end-type beams are establish/installed the steel limit stops, which insure building in the case of failure of automatic braking devices. In cranes with load capacity up to 30 t they of double-T section/cut with buffer from beam, in tap/cranes by load capacity are more than 30 t ~~Vol.~~ - box section with spring buffer.

By means of the experimental investigations by the institute Lenpromstroyproyekt, are developed in the volume of technical solutions the crane beams for tap/cranes by load capacity 50 t and more with step/pitch of columns of 6 and 12 m. The construction of these beams is analogous by that, which it was discussed above. Their height to 2 m. For an improvement in the conditions of the anchoring of the stressed reinforcement, the end/faces of beams are reduced by vertical bolts.

The crane beams for tap/cranes by load capacity 50-125 t by the stress of reinforcement "on concrete" and "on detents" are applied in the main housings of thermo-electric powers station.

Sheet 46. Steel communication/connections of reinforced-concrete constructions.

In transverse direction the stability of buildings is provided by the rigidity of the embedded into foundation columns and by the rigid disk of coating, lengthwise - additionally by steel connections, adjustable on all series between columns and supports of rafter constructions.

Intercolumn steel communication/connections are furnished in the average cell of temperature section in cockless buildings at the height of locations from 10.8 m within the limits of the above-grade height of columns; in buildings with supporting/reference tap/cranes - at any height of locations in the altitude limits of the crane part of the columns. According to diagram steel communication/connections are subdivided into four-way and portal. Cross bonds usually are established in the elongated on vertical line rectangles, characteristic for a step/pitch 6 m; portal - in the elongated on

horizontal rectangles, characteristic for a step/pitch 12 m. Series columns are connected with connecting columns by the spacers, which pass on their top in cockless buildings or by the crane beams - in buildings with supporting/reference tap/cranes.

Connections between supports of structural constructions are establish/installed only in beams and the farm/trusses with parallel belt/zones, which are applied with flat/plane roofing. Their height on support 1.2 m and more. These communication/connections are furnished in extreme cells, and with considerable wind effort/forces - additionally and on average, but it is not more frequent than through one step/pitch. At the length of temperature section 60-72 m, the total quantity of such communication/connections can be not more than five with step/pitch 6 m and it is not more than three with step/pitch 12 m. Series farm/trusses are connected with connecting farm/trusses by braces, which pass on the top of columns, and by the disk of coating.

In other words, spacers on the top of columns are establish/installed in the absence of frame-supporting constructions in cockless buildings of location from 10.8 m in height and in buildings with flat/plane roofing.

Extreme frame-supporting farm/trusses are linked by steel

spacers with the upper belt/zones of the trusses additionally to communication/connection, provided with the disk of coating.

In lantern apertures segmental farm/trusses for the stabilization of upper belt/zone are unfastened by horizontal communication/connections in two cells with the step/pitch 6 m and in one - with step/pitch 12 m. Series farm/trusses are connected with connecting farm/trusses by the passing on horse spacers.

In buildings with the supporting/reference tap/cranes of arduous duty or another equipment, calling the fluctuations of constructions, the lower belt/zone of rafter beams and farm/trusses in the middle of flight/span is additionally untied by braces and vertical communication/connections, establish/installed in extreme sections.

Horizontal effort/forces from suspension single-beam tap/cranes are transferred by the system of stiffening joints for columns or special constructions.

The rods of connections are designed from the conjugate rolled sections, weldable by cover plates and junction/unit junction plates. To laying cell/elements in the reinforced-concrete articles of communication/connection, they are connected on bolts with followed welding.

Sheet 47. Steel columns.

Steel columns of the given type (series ~~koe~~ KE-01-43) are developed for the buildings, equipped with supporting/reference tap/cranes by load capacity to 250 t with the mark of the knob/cap of crane rail to 20 m. Step/pitch of columns on an external and average series of 12 m.

The branches of crane part form: in extreme column welded channel bar and welded double T with the height of wall depending on the mark of the knob/cap of crane rail 500 or 710 mm, in middle column - two welded double T of wall 500, 710 or 900 mm in height. Branches are connected by the grate from angle irons, intensified by horizontal diaphragms, and crosshead at the level of the support of the crane beams. The step/pitch of the horizontal rods of grate in extreme columns will agree with the height of wall panels (1.2 and 1.8 m), but in average columns it is taken as equal to the axial distance between branches (2-3 m). At the height of columns 19.8 m and by pain above the crosshead is arranged assembly joint.

Cross piece, which links above-crane and crane parts of column, one- or two-wall. Single-wall crosshead is passed through gashes in

welded airfoil/profiles, and two-wall is welded outside to flanges.

Above-crane part - welded double T of wall 500 mm in height - with the joining of extreme column "250"; 710 mm - with joining "500" and 900 mm - with the device of pass at the level of crane ways. the end of column is calculated for hinge fitting of the trusses.

Bases of columns, separate under each branch, are fastened to concrete foundation by anchor bolts. Bolts up to 48 mm in diameter are passed directly through the base plate, arrange/located in this case on mark -0.4 m. The bolts of larger diameter are passed through the welded-on to the flanges of the branches of column anchor crossheads. In bases with anchor traverses, the base plate is furnished on mark -1.00 m.

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Sheet 48. Steel crane beams.

Steel crane beams (series KE-01-24) have airfoil/profiles of two types. In the buildings of the normal mode of the work with the step/pitch of columns 6 m and tap/cranes with load capacity to 75 Vcl. - beam of curved profile with the developed upper belt/zone, independently receiving horizontal braking efforts. Out of the parameters - beam of symmetrical airfoil/profile indicated with the identical belt/zones where the horizontal effort/forces are absorbed by the arranged/located in the plane of upper belt/zone braking beams or farm/trusses.

Usually is applied the split diagram of beams with the joints of cell/elements on supports. During the provision for a small and uniform upsetting of supports (rock basis/base or solid foundation) can be accepted the solid/continuous diagram, which leads to certain savings of steel. ¶The height of beams on support from 650 mm and more with the gradation through 200 mm corresponds to the height of walls into 600; 800; 1000; 1200 mm and so forth. The section/cuts of

belt/zones and walls are accepted in conformity with standards to broadband universal plate (GOST [ГОСТ - All-union State Standard] 82-57). The walls of beams - verticals are intensified by the conjugate cross ribs of rigidity made of strip steel, arrange/located through 1.5 m. To the lower belt/zone of the beam of stiffening rib, they are not welded.

Series beams rest on the arm of columns centrally along transverse axis by fulcra with planed lower edge. Of end-type and temperature beams the edge of fulcrum is applied to the lower belt/zone, under which in this place is welded the block/backing 60 mm in wide. All beams are fastened in the place of support with the anchor bolts, passed through lower belt/zone and base plate.

The upper belt/zones of the beams of symmetrical airfoil/profile are untied by braking farm/trusses or the beams, receiving horizontal braking efforts. The lattice of braking farm/trusses with the step/pitch of perpendicular rods 1.5 m is welded from angle irons. The horizontal wall of braking beam forms the band of riffled sheet steel 6 mm in thickness, intensified through 1.5 m by stiffening ribs. With the device of passages at level of crane ways on braking beams is packed the protected/surrounded wooden flooring, and on braking beams are established enclosure/protections.

The lower belt/zones of beams by flight/span 12 m are untied by transverse vertical communication/connections.

The railway rails are fastened to the upper belt/zone of beams to hooks from rods 22 mm in diameter; special crane rails - on clamps. Step/pitch of fastenings 750 mm. In the middle part of the beams of clamp, staggered. Thereby in this section/cut is decreased by half a quantity of bolt holes.

In the upper part of the sheet, is given the table, which makes it possible to determine basic dimensions and the section/cuts of steel crane beams for construction in the volume of technical project.

Sheet 49. Steel trusses with the gradient/draft of upper belt/zone 1:8.

Sheet 50. Steel frame-supporting farm/trusses and the assembling assemblies of the trusses.

The steel braking farm/trusses, two-slope surface, with the gradient/draft of upper belt/zone 1:8 and horizontal lower belt/zone, flight/span 24, 30 and 36 m are subdivided into untrussed and strut with angular transmission loads respectively through 3 and 1.5 m.

Height of all farm/trusses on support on the pickaxes of angle flanges 2.2 m, and taking into account the construction of supporting assembly 2.35 m. For the purpose of savings, became flanges were designed alternating/variable along the length section/cut, also, taking into account the possibility of applying two different trademarks of steel - "steel 3" with calculated resistance of 2100 kg/cm² or low-alloy steel with calculated resistance of 2900 kg/cm². The rods of lattice in both cases are made made of steel of mark/brand "St 3".

The rods of farm/trusses are designed of two rolling angle irons, connected during packing. Packing are furnished in thirds or fourths of free length between junction/unit junction plates at a distance not more than 40 radii of inertia of angle iron from the plane of farm/truss for compressed and 80 radii - for the tie bars. Thickness, junction/unit junction plates and packing - from 8 to 18 mm depending on effort/forces in flanges.

Supporting assembly consists of fulcrum 0.5 m in high with the planed lower edge, perpendicular to it junction/unit junction plate and horizontal plates. For providing the central transmission of supporting/reference effort/forces, lower horizontal plates with

holes for anchor bolts are welded above the edge of fulcrum so that during the setting up of farm/truss would be preserved clearance in 3 mm between them and end of column. Upper horizontal plate is utilized for fastening intertruss support strut.

The support strut above the extreme column - is welded, double-T section/cut with a height of 200; 250 and 500 mm respectively with couplings of "0"; "250" and "500", also, above the middle column - four-way section/cut of two angle irons, it is connected on bolts with supporting knots of a truss. This joint can be made at plant, then undersupport struts are included in plant shipping mark/brands.

Shipping mark/brands consist of half-truss connected by field joints. Cover plates, suspensions and tightening in field joints first are connected on bolts. Joints are welded after the adjustment of the geometric dimensions of farm/truss. With zero joining the height of the section/cut of extreme undersupport strut enters in the length of extreme panel. Therefore flanges in this panel are shortened on 200 mm.

Couplings of farm/trusses with reinforced-concrete and steel columns hinged. With the frame coupling of farm/truss with steel columns, with the suspension of tap/crane, ceiling and other disregarded loads the geometric diagram of farm/trusses is retained,

but the section/cuts of separate rods are strengthened.

Sub-frame farm/truss - by flight/span 12 m with parallel belt/zones. Height of farm/truss on the pickaxes of angle irons 2.68 m. It is fastened to steel supercolumn 0.7 m in high, which compensates for the decrease of the height of column. Frame-supporting farm/trusses are established on average series of columns. The fulcra of the trusses rest on supercolumns and the stands of frame-supporting farm/trusses in the flight/span between columns. The bearing pressure, transferred by the trusses on frame-supporting, is within the limits of 40-150 t.

The assembled constructions are stained for corrosion protection with oil paint. After testing of the correctness of the position of the farm/trusses of the nut of constant bolts in supporting assemblies, they are fastened by welding or the driving in of thread.

Sheet 51. Steel trusses with the gradient/draft of upper belt/zone 1:3.5.

Steel trusses with the gradient/draft of upper belt/zone 1:3.5 are intended for the overlap of single-span unlighted, unheated storage areas with roofing from corrugated asbestos cement sheets. Storages are equipped by suspension single-beam tap/cranes by load

capacity to 5 t or by supporting/reference tap/cranes by load capacity to 30 t.

The farm/trusses of triangular configuration, with horizontal lower belt/zone, flight/span 18; 24; 30 and 36 m are made in accordance with the length of roofing corrugated asbestos cement sheets with the junction/unit transmission of load through 1.5 m. Load is transferred by the arranged/located by the upper belt/zone steel drive/girders, to which are fastened the roofing sheeting.

Rods, farm/trusses and drive/girders are manufactured from the rolled sections of steel of mark/brand "steel 3", spacers on the supports of the trusses - made of steel of the lightened bent airfoil/profile according to GOST 8278-63. During use in the drive/girders of the lightened airfoil/profiles of instead of rolling, is reached the savings of steel of approximately 3 kg to of 1 m² of coating.

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The plant and assembling assemblies of triangular farm/trusses, with the exception/elimination of supporting/reference, are analogous to the described above polygonal farm/trusses. Supporting assembly provides for the diverse variants of the joining of columns. With

large loads the junction/unit junction plate of supporting assembly increases within the limits of extreme panel and is strengthened by inclined fin/edges.

Fermat rests by the planed surface of fulcrum on the steel end of column and is fastened on it by the way of bolts and erection welding. In buildings with supporting/reference or suspension tap/cranes, lower flanges are untied by communication/connections just as in buildings with arduous duty.

Sheet 52. Communication/connections of steel constructions.

The dimensions of section/cut and the connected with it rigidity of the plane of the transverse frame of steel columns are more than in reinforced-concrete, and of steel farm/trusses it is considerably less than in reinforced-concrete rafter constructions. Because of this communication/connections on steel columns are analogous in arrangement to communication/connections on reinforced-concrete columns, but they can be made from the lightened airfoil/profiles. The longitudinal stability of the trusses is provided by steel communication/connections, arrange/located in the planes of upper and lower belt/zones and in longitudinal vertical planes.

Communication/connections vertical and in the planes of upper

flange are necessary in any building. They consist of the crossed systems, which link in pairs of bound trusses, and the spacers, which link of the assemblies of upper belt/zone series trusses with bound. Crossed bound systems are furnished in the extreme cells: in the planes of upper belt/zone, subsupport truss, in vertical planes along middle of flight/spans 24 and 30 m and in the thirds of flight/span 36 m. Spacers link each second or third assembly of upper flange under the flooring of coating and each assembly in the zone under the light.

The calculation of communication/connections is produced taking into account the perception of the part of longitudinal forces by the rigid disk of the monolithizedd flooring slabs. Flooring slabs are welded to the trusses not less than at three points each. Fastening communication/connections to upper flanges is realize/accomplished on bolts M 20. The welded joints of coupling elements are designed for effort/force 8.0 t.

Communication/connections in the plane of lower flange are arranged two types. Intensive communication/connections are established in buildings with arduous duty, with frame-supporting farm/trusses on average series, at the height of single-span building of more than 20 m, and multispan - at height are more than 25 m, with crane load more than 50 t and with their two-level arrangement. These

communication/connections consist: 1) of the crossed systems, arrange/located across building, in extreme cells at the length of section to 96 m and with interval 48-60 m at the length of section of more than 96 m; the crossed systems, arrange/located along building - on extreme and average series of the columns through two flight/span in buildings with heavy and through three flight/span - in buildings with the common operating mode; 2) of spacers and the braces, indicated below.

Communication/connections in the plane of lower flange of remaining buildings consist only of the spacers, which pass on subsupport struts, and of the braces, which pass between the crossed by bound systems in vertical planes.

In buildings with a jump/drop in the heights, the communicating system is solved independently for the increased and lowered/reduced flight/spans. For the perception of horizontal braking efforts from suspension tap/cranes if necessary, is designated additional communicating system.

Chapter 6.

STANDARDIZED ELEMENTS OF ENCLOSURES

To the enclosure/protections of industrial buildings, can be referred all cell/elements, which ensure insulation/isolation of locations from atmospheric conditions, their internal separation and communication with each other. The first group includes external walls, including filling of window, door and gate apertures, roof, lamp/canopies and hems on soil; to the second - partition and official staircases, and in the multistory buildings - hem on overlaps and transport units.

The external walls of production locations are subdivided according to structural/design sign/criteria into carriers (receiving load from coating and overlaps), that self-support (receiving dead weight by height of building), panel and frame (transmitting load on basic and auxiliary framework/body). They are made by the methods of laying (brick, small and large blocks) and of batch to framework/body (panels and sheet material).

Most progressive and characteristic for industrial Soviet industrial construction are walls from the panels, fastened to basic

framework/body, and frame walls from corrugated asbestos cement sheets. Their constructions, articles, assembly diagrams and units are unitized for mass application/use. The characteristic for panel walls film/strips of glazing are formed by wooden or steel window panels, according to size/dimensions and by constructions of fastening interchanged with panels on anechoic sections.

The carrying and self-supporting walls from the cell/elements of laying are raised with the application/use of local materials with economic advisability. Characteristic for these walls separate window apertures are filled with wooden, steel or reinforced-concrete interlacings. In this work they are not examined.

The standardized cell/elements of roof include the large-size plate/slabs for girderless flooring, which rest directly on rafter of support.

In unheated buildings and shops with surplus production heat release, are applied the packed on drive/girders roofing corrugated asbestos cement sheets. Above dangerously explosive locations are packed the plate/slabs with holes in flanges and the filling, easily jettisoned by air wave.

In mass order are applied at present sloping coatings from

girderless flooring with water-insulating carpet from roll materials and internal drain. Such coatings are characteristic for the heated industrial buildings with the natural temperature and humidity conditions/mode, which ensures the continuous slight melting of snow.

The development of the construction of sloping roofings occurs to the side of approach with the construction of flat/plane roofings. In 1965 in sloping roofings, they began to apply unsloping heated units identical to the flat/plane roofings of contiguity to waters intake, to parapets, etc.

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Flat/plane roofings with the intensive water-insulating carpet are applied in the experimental order above the sealed buildings with constant temperature-humid conditions/mode. On their configuration they are progressive for composite buildings, since is reduced the number of typical dimensions of composite articles and assembling it is butting.

For natural illumination and aeration in sloping roofings, are applied the standardized longitudinal light-aeration and aeration lamp/canopies. These constructions flat/plane roofings are in connection with supplemented by the developed in experimental stage

zenith light lamp/canopies from the translucent cupolas, adjustable above apertures in the thickened reinforced-concrete plate/slabs, and the translucent plate/slabs, included in roofing flooring.

Sheet 53. Enclosure/protections from corrugated asbestos cement sheets.

The corrugated asbestos cement sheets of the intensive airfoil/profile are applied in the enclosing constructions of unheated industrial buildings and shops with surplus heat release at height from 3 m. The lower part of the walls, subjected to mechanical effects and moistening by surface water, is satisfied from reinforced-concrete panels.

Length of sheets 1750; 2000 and 2500 mm, width 994 mm (width in matter minus of transverse lap 835 mm), wave amplitude 167 mm, wave height 50 mm, the thickness of asbestos cement 8 mm.

Sheets 1750 mm in long - series and 2000 mm in long cornices are applied for the device of roofing. They are packed with gradient/draft by 1:3.5 and with longitudinal lap in 200 mm on steel drive/girders from the rolling or bent airfoil/profiles. Horizontal projection is the distance between drive/girders 1.5 m.

Sheets 2500 mm in long are applied for the enclosure/protection of walls. They are hung up with vertical lap in 100 mm to the cross bars of analogous to the drive/girders of the constructions, arrange/located through 2.4 m on height.

Cross bars and drive/girders are welded to columns and farm/trusses. Asbestos cement sheets are fastened to cross bars and drive/girders with the hangers, which penetrate them in wave crest. Watertightness in this place is provided by the arrangement of hole outside drain and with punched washers with the cushions, closely fitted to wave.

At the points of the intersection of longitudinal and transverse lap, the angles of average sheets are shorn; joint is packed by decreasing the stratification of sheets.

The clearances between corrugated asbestos cement sheets in horse and cornice of roofing, in angles, couplings with the sashes, gate frames by the panels of walls are covered with the shaped asbestos cement parts, tack/caught by the same hangers. The chute parts, which cover deformation welds, are propped against brackets to the edge that envelope inside corrugated sheet.

For inspection and repair of roofing along horse, is arranged

the made of planks working course, which rests on the bolted to sheets foundation beams. At the height of building of more than 10 m along the overhang of roofing, is established steel enclosure/protection.

Sheet 54. Wall panels (types and assembly diagrams).

Wall panels are intended for the walls of single-stage industrial buildings with different temperature and humidity conditions/mode. On the position within wall, they are subdivided into privates, angular - extended, parapet for longitudinal and end-type walls, cornice and pier.

All panels, with the exception/elimination of those stipulated are below, are made by nominal length 6 m and 1.2 and 1.8 m in high. The thickness of panels to 0.4 m is determined by their construction and the necessary thermal stability. Angular panels are lengthened to the averaged thickness of walls -0.25 m. The parapet panels of end-type walls in buildings with sloping roofing have chamfered face side, the height of side faces 0.6 and 1.8 m. Cornice panel - is reinforced-concrete, L-shaped section/cut, by the height of 0.3 or 0.6 m and by the escape of arm 0.45 m. Pier panels by 0.75; 1.5 and 3.0 m are applied within walls with separate window apertures.

All panels are designed for load due to wind by their area. Parapet and cornice panels are furnished along the top of walls and are connected to the constructions of coating. They absorb loads from repair cradle (2x0.5 t, applied at a distance of 2 m of each other).

By the construction of panel, are subdivided: into reinforced-concrete - for unheated buildings, that represent by themselves finned shells the height of whose fin/edges are 120 mm and the thickness the flanges in 25 mm; three-layered reinforced-concrete - assembled from two finned shells and the pressed between them plate heater in up to 300 kg/m³ specific weight and the panel of the solid section, made from lightweight concrete in up to 900 kg/m³ specific weight, finished with two sides by the layer of cement-sand mortar 15-20 mm in thickness.

The reinforcement of reinforced-concrete finned shells is produced by welded reinforcing meshes and framework/bodies, the panels of solid section - only by framework/bodies. Welded meshes are manufactured from reinforcing wire, And framework/bodies - from the hot-rolled cruxes of periodic airfoil/profile. With the assembly of the three-layered reinforced-concrete panels of shell, they are connected during welding of the laying cell/elements, arrange/located on longitudinal faces.

All panels are equipped by loops for lift and by laying cell/elements for fastening to the framework/body of building. Parapet and cornice panels have additional laying cell/elements for the connection of the constructions of coating. In the case of the replacement of window panels by steel interlacings according to GOST 8126-56 under and above the window aperture are installed with connecting panels, equipped with laying cell/elements for fastening of vertical imposts and calculated for the perception of load due to wind by an entire area.

The panel walls of industrial buildings are comprised from wall and window panels, gates and doors in multiple to the size/dimension of panels framing. The base part of the walls is formed by panels 1.2 ~~by~~ m in high, which rest on foundation beams. Are above established window panels by film/strips along entire facade, interrupted on individual sections according to technological requirements or architectural project. On the height of the wall of the film/strip of window panels, they can be furnished several tiers; for example in buildings with supporting/reference tap/cranes hearth, also, above the crane beams. Greatest height of window aperture first tier 7.8 m for wooden and 12 m - for steel window panels and 7.2 m - for the subsequent tiers.

At the level of the top of windows, wall panels are established

to the bearing brackets, welded to columns. In the anechoic sections of walls, the bearing brackets are furnished above the first tier of series panels at height to 12 m with light-concrete and to 19.8 m - with reinforced-concrete wall panels and further through 4.8 m above all subsequent tiers. The bearing brackets protect panels from destruction by pressure the dead weight of wall.

The angles of buildings are filled with the extended panels of solid section and with the reinforced-concrete panels, extended by attaching light-concrete blocks. In the pediments of buildings with sloping roofings, are established trapeziform parapet panels.

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Sheet 55. Wall panels (fastening to columns).

Sheet 56. Wall panels (fastening to coating).

On the device of the standardized fastenings to reinforced-concrete framework/body, panel walls are divided on height on two parts, the boundary/interface between which passes on 0.6 m lower than the end of columns. In the lower part of the wall of panel, they are fastened to columns, in upper - to the constructions of coating and steel extensions and the nozzles of columns. The lower

part of the wall, as a rule, is completed by the film/strip of window panels; upper are formed a series of privates and a series of parapet panels.

The flanges of angle irons - bearing brackets, welded to laying cell/elements in the external face of columns at the level of the top of windows and of tiers indicated above, is formed between the column and the panel clearance in 15-20 mm.

In the welds between panels (horizontal 15 mm in thickness and vertical 20 mm in thickness) is packed the cement-sand mortar, while in buildings with the increased atmospheric humidity on two face of the panel before the setting up into wall, are stuck elastic synthetic packing. The thickness of packing in the side seams is record/fixed by the arranged/located on the edges of panel rigid pillows, welds are calked by the sealing mastic.

Fastening panels to the framework/body of building within the limits of story allow/assumes temperature-expansion deformations in vertical plane. It is formed by the link of detent with grapple.

Detents are made from equal angles 125x14 mm, by length 50 mm. They are welded to laying cell/elements in side faces of column on 40 mm lower than weld with projection 15-20 m relative to external face,

that ensures the clearance indicated. Panel is installed by tap/crane to a lower series and is adjusted by mounting fixtures to detents. Then with the filling of welds with the cement mortar to laying angle irons in face side of panels are welded forming link hangers - the angle irons of the same size/dimension, and laying angle irons in the lower bound of panels they can be welded to the hangers of a lower series.

With the cushions the hangers are made from the bent plate by section/cut 60x16 mm, by length 200 mm, they are welded to the vertical flange of the laying angle iron of panel and do not disturb the seal of welds.

If the place of fastening panels is misaligned beyond the limits of laying angle irons, for example of the angles of end-type framework, then that welded to them the flange of hanger is developed and is supplied with hole for an assembling weld.

During fastening of wooden window panels, the hanger is made from the l-shaped iron 140x90x10 mm, by length 90 mm from that welded to the lower and upper trace of boxes. The boxes of steel window panels are propped against the detents, designed in this case from equal angles 90x8 mm, by length 110 mm.

Of the steel columns of t-beamed section/cut, the detent is formed by the welded-on to external face plate/bar by section/cut 50x14 mm, that protrudes on 100 mm into both sides for the flanges of brand.

In fastenings of panels to the constructions of coating, is retained the described system of free link, but the length of detent is developed to the value of joining with additional angle iron. During fastening of parapet panel to flooring slabs, the detent can be replaced by loop from rod 12 mm in diameter, and hanger is welded of two bolsters of rod 22 mm in diameter. Fastening of parapet panels to steel nozzles is made on hangers from angle irons with the developed flanges, cranked up after to flange nozzles or the welded-on to it plate/bar.

Final assembly plate/slabs by size/dimension 40x400x600 mm, which overlap that formed by the value of joining the breakage between the flooring and the parapet, rest on to the flange of the through angle iron, welded to laying cell/elements in the parapet panel through intermediaries from plates. With joining "250" they are packed lengthwise, while with joining "500" - across breakage.

Sheet 57. Steel window panels.

Sheet 58. Wooden window panels.

Glazing the walls of industrial buildings depending on the required thermal stability and the seal is made single, double to height 3.6 m of floor level and double to overall height. Single glazing is arranged in unheated buildings and in the absence in immediate proximity of the windows of stationary work areas; double to height to 3.6 m shields work areas from the currents of cold air; double to overall height is made in the pressurized holds with constant temperature and humidity conditions/mode.

Within panel walls the vitrified part is made from steel or wooden window panels. Steel panels are applied in the buildings of the increased stability, in metallurgical plants and shops with the increased atmospheric humidity; wooden panels - in shops with normal temperature and humidity conditions/mode.

On the basis of interchangeability conditions with wall panels, steel and wooden panels are manufactured with nominal altitude into 1.2 and with 1.8 m and 6 m in long. The assembly of wall and window panels is conducted simultaneously during analogous fastenings. The internal planes of window panels are misaligned outside with respect to the plane of wall.

The construction of window panel consists of box - framework, receiving loads due to wind and connected with the load-bearing frame of building, and the interlacings, which directly frame glazing and which fill the sections of box with area to 2.5 m².

Casements occur anechoic and double - open/disclosing for the natural ventilation of locations. Anechoic interlacings are screwed down to box, and double are hung up on the loops, arrange/located to side, upper or lower bounds. Interlacings with horizontal rotational axis are called transoms. On erection drawings the opening of interlacings is conditionally designated by two by inclined, convergent in the center of rotational axis lines, solid for external and broken for an internal flap.

In steel window panels external and internal interlacings separate, in wooden - paired, connected on tie pieces and opened only for the rub of glasses. Interlacings with side suspension, length approximately 0.8 m are placed on the edges of panels - against columns in the anechoic zone of double glazing. They are open/disclosed by hand and in wooden version at the height of panel 1.8 m can be made with windows. In steel version internal interlacing anechoic, and external is open/disclosed for the rub of glasses.

Three Central frames, by length approximately 1.5 m each, form

the open/disclosed front of panel. The opening of series or several series of transoms is realize/accomplished by a lever/crank instrument with electrical or hand drive. The action of mechanism is instituted on transformation of rotary motion of block into the oscillating motion of window transoms. In steel separate interlacings external transoms upper-suspension, and internal lower-suspension. They are linked by the in pairs of inter-window instruments, fixed to side braces. With the opening of windows, the currents of cold air head upward between planes are framed.

In steel window panels (series PB-05-50) the upper and side braces of box are made from curaved U-sections according to GOST 8278-63.

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Lower brace - from the special bent airfoil/profile. Braces of transoms and interlacings - from the hot-rolled airfoil/profile No 6 according to GOST 7511-58. All the joints of cell/elements are welded. Glass are pressed against the flanges tees by clinch rivets. Joint is packed by cement or rubber rim, which encompasses the edge of glass.

Steel window panels 1.8 m in high (height of upper panel 1.75 m)

are established close to each other and are connected by the bolts between themselves and with the welded-on to columns detents. Flat weld between the wall and the window panel is filled with cement-sand mortar, upper and the side welds are covered with steel battens.

In wooden window panels (series PB-05-47) the upper and side traces of box are made from bars 144 mm in width in the first and by 174 mm in the subsequent wind regions. Height of section/cut 47 mm - all vertical and horizontal bars at the height of panels 1.2 m and 72 mm - horizontal bars at the height of panels 1.8 m. Section/cut of vertical imposts 144x54 mm. All traces of external interlacings - from blanks with cross section of 54x67 mm; internal - 44x44 mm. Locking is packed by the arranged/located on perimeter wooden rack or the cushion. All the joints of cell/elements sized tenon. Glass are pressed in the grooves of the traces of interlacings and slabs by the wooden molding/bars of triangular section/cut by size/dimension 10x16 mm. Before the glazing into grooves, is laid the cement. For the arrangement of molding/bars secretly the depth of the grooves of internal interlacings increases.

During assembly connecting panels are fastened between themselves by nails. Fastening instruments are screwed on by wood screws. Weld throat is record/fixed by the packing from panels, located under vertical traces, imposts, also, in two-three places on

side faces. From outer and inside the welds between panels are covered with with battens, and contiguities to columns are packed by the cushions.

Window stool plums are covered with apron from the zinc-coated roofing steel or shaped asbestos cement sheets.

Wooden panels with anechoic single glazing are made without interlacings, grooves for glazing are removed in the cell/elements of box. For filling of separate apertures, are provided for additional window panels in standardly designated 1.5 and 3 m long.

Sheet 59. Doors.

Nominal sizes of door apertures in industrial buildings are multiple on horizontal to module/modulus 0.5 m, on vertical line - module/modulus 0.6 m; the structural/design size/dimensions of apertures increase by weld throat. In basements and tunnels the height of apertures 1830 mm, in production locations - 2430 mm. Width of apertures 765 and 1015 mm for one-floor and 1515 and 2015 mm - for two-floor doors.

In wooden boxes the door fabrics of one-floor doors already on 50 mm the corresponding to them two-floor doors. The width of wooden

it is flown two-floor doors it can be increased because of armatures. in steel boxes the size/dimensions of fabrics coincide. Steel door fabrics are stored for all apertures by means of two die/stamps. Door fabrics up to 0.7 m in wide can be prepared by height 2 m and are supplemented by anechoic transoms.

In the form of door, are subdivided into one- and two-floor, also into anechoic and vitrified. Two-floor doors are made with locking "into fourth" or without locking with the rocking fabrics on bilateral loops. Last/latter type doors are made only with the vitrified fabrics and are established in the places of the changing in the direction intense flow of people.

The construction of wooden doors is accepted according to GOST 6629-64. Wooden boxes - from bars 74 mm in wide with lintel are one-sided and without it - with bilateral loops, without threshold, embroidered from below by assembling panel. Wooden door fabrics 40 mm in thickness - from sized panels with solid or latticed filling either from particle boards with armatures or without armatures on outline/contour. Shield fabrics with latticed filling are faced by solid or extra-hard wood-fiber board or plywood.

The construction of steel doors is accepted on the album of institute Electroheat-plan (No 42,731-s after 1960). Steel boxes -

from rolled sections from lintel with one-sided and without not - with bilateral loops. Steel fabrics - from that machined by cold pressing of rolling sheet steel 2 mm in thickness. Cold pressing of all fabrics is realize/accomplished by two die/stamps in the constant/invariable position of blank. For the extrusion of louver, the punch/male die is supplied with replacement parts.

With one-sided loops of batten, it is welded to right fabric.

Doors from glass of the type "stalinite" with the rocking fabrics are applied in main entrances and the vestibules of industrial buildings under conditions, not calling contamination.

Sheet 60. Gate.

Gate they are established in the places of passage in the production locations of truck and rail transport. By the construction of opening, they are subdivided into unfolding two-floor and extension one- and two-floor. Gate aperture frames by the composite reinforced-concrete frame, which is entered according to overall sizes into cutting of panel wall accepted. In one of the gate, it is flown it is arranged wicket.

The fabrics of unfolding gates are hung up to loops. Lower loops

are equipped by the spherical ball bearing, which adjusts itself under the action of vertical load.

Upper loops are calculated for the perception of horizontal forces.

The fabrics of extension gates are hung toward upper guide on two travelers. The vertical position of fabrics is record/fixed by lower guide.

The steel framework/body of fabrics (brace from channel bars, middles with double T, struts made of strip steel - *only for* unfolding gates) is filled with made of planks panels and the vitrified interlacings. The block braces of panels and box of interlacings are assembled in framework/body via moving sidewalls to the journals, placed in outrider and bottom part. Panel consists of two series of cars with layer of the disinfected and wrapped up into pergamyn felt.

In connection with the dimensions of wicket, the height of the lower tier of framework/body is accepted without depending on the size/dimension of the fabrics of the equal to 2.08 m.

In order to avoid insufflation on the outline/contour of gate

frame, to framework/body are welded battens made of strip steel, and the slots between unfolding fabrics and hearth by them are closed by flexible aprons from rubber and tarpaulin.

Gate they are equipped by the power drive, the assembly of instruments for a manual opening and by thermal curtain in the heated buildings. Safety switches of the power drive de-energize system with the incidence/impingement of the foriegn body between fabrics and in the period of the opening of wicket.

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Sheet 61. Coatings (plate/slabs for a step/pitch 6 m, valleys (deformation welds).

Sheet 62. Coatings (plate/slabs for step/pitch 12 m, contiguity the walls).

The coatings of industrial buildings are subdivided:

on the configuration of roofing - into planes and sloping with gradient/draft from 1:20 to 1:3.5;

according to thermal insulation ability - to warm, lukewarm and cold;

on the organization of drain - for coatings with internal and external drains.

using the material of roofing - to carpet, from those stuck by the water-insulating mastics of roll materials and from corrugated asbestos cement sheets.

The flat/plane coatings, atticless and with technical garrets are arranged at present in the experimental order above the sealed buildings with constant temperature and humidity conditions/mode. They are lukewarm, with internal drains, with water-insulating coating of four-five layers of roll materials, covered with two layers of ground into mastic gravel. In summer flat/plane roofings can be poured with the layer of water in 25-50 mm by depth.

Reflecting solar ray/beams and forming large surface for evaporation, water screen cools roofing and protects water-insulating carpet from softening and cracking. In location also is created fresher and more uniform temperature. The level of the infusion of water on roof is record/fixed by the deposit branch connections, inserted for the summer period into the funnels of internal drains.

Sloping roofings with water-insulating carpet of three-four layers of roll materials cover/coat almost all the elevated for the latter of 40 years industrial buildings. Slopes with transverse relative to flight/span gradient/draft into 1:12-1:3.5 (gradient/draft 1:3.5 in the extreme panels of segmental farm/trusses) intersect with walls on extreme and between themselves along average center lines. These intersections of slopes form trough - valley in which collects the draining from roofing water. Along trough through 12-24 m, are arrange/located the funnels of internal drains, connected with shower canalization/sewerage.

A quantity of drains is determined by climatic conditions. In the middle strip of the Soviet Union the maximum distance between funnels 24 m, and the area of the catchment of funnel of approximately 300 m^2 on sloping and to 900 m^2 during flat/plane roofing.

Funnels and the linking them with channeling of branch connections 100 mm in diameter cast from cast iron. Three Basic parts of the funnel - connected with standpipe widened branch connection, clamping ring and receiving cap/hood with slit-shaped holes. In the heated roofings the branch connection is established in special light-concrete block. Water-insulating carpet on approach to funnel is strengthened by the additional layers of pergamyn or unsanded tar

paper and sacking, impregnated with mastic. The edges of carpet are pinched between the flanges of branch connection and clamping ring.

The normal operation of internal drains is based on slight melting of snow and glaze with the heat of building. External drains are applied in the heated buildings with the warm roofs, which eliminate slight melting snow and forming glaze on cornices, and in unheated buildings - without surplus production heat releases. Usually they free along the length the overhang of the cornices of building. The organized external drains consist of wall grooves and drain pipes.

Warm coatings are eliminated above rooms with the increased atmospheric humidity for the elimination of the possibility of the condensation of moisture; lukewarm coatings - above locations with normal temperature and humidity conditions/mode; cold galvanizations - above unheated buildings and shops with surplus production heat releases.

In structural/design sense the standardized coatings are subdivided into carrying flooring from reinforced-concrete plate/slabs; coating or carpet steam-insulated from hydrostable mastics and roll materials (only above locations with the increased atmospheric humidity); heater from the light-concrete and wood-fiber

boards or other local materials in up to 800 kg/m^3 specific weight (only above the heated locations); cement or asphalt tie piece and the stuck on it water-insulating carpet of 3-5 layers of the roll materials, packed into appropriate impregnation mastics. The lower layers of water-insulating carpet can be made from pergamyn or unsanded tar paper, upper stand - from ruberoid or roofing. In flat/plane roofings and troughs of sloping roofings in connection with the possible stagnation of water, water-insulating carpet is cover/coated with the protective layer of ground into mastic gravel.

Carrying flooring with the step/pitch of rafter constructions 6 m is made from reinforced-concrete ribbed slabs in nominal 1.5 and 3 m wide, with the height of fin/edges 0.3 m, with the stressed and unstressed reinforcement and from light-concrete plate/slabs 1.5 m in wide. With the step/pitch of rafter constructions 12 m, carrying flooring is made from ribbed slabs in nominal 1.5 and 3 m wide, with the height of fin/edges 0.45 m, with that stressed reinforcement, also, from the reinforced-cement plate/slabs of double curvature 1.5 and 3 m in width.

The most widely used finned reinforced-concrete plate/slabs by nominal size 1.5x6 and 3x6 m are manufactured by the flow-aggregate method without the stress of reinforcement or with the stress of reinforcement on pan/pallet or in an bench manner with the mechanical

tension of the reinforcement of fin/edges or detents. For the possibility of the immediate removal of the molds of the face of plate/slabs, are somewhat sloped. At the ends of the longitudinal fin/edges - steel shoes, intended for welding with rafter constructions and for the anchoring of the stressed reinforcement. Plate/slabs with size/dimension 12x3 m are molded with cross ribs from the laying prestressed bars.

Plate/slabs from cellular concretes of autoclave consolidation are intended for the coating of the heated locations with normal temperature and humidity conditions/mode, without the chemically agressive air medium. Plate/slabs are reinforced by flat/plane meshes and framework/bodies. The solution key, which ensures the joint operation of plate/slabs, is formed with filling of groove/slots in longitudinal faces. On supports the key is reinforced for the purpose of the decrease of sagging/deflection via a certan jam of plate/slabs. For protection from moistening during storage of plate/slab, they are stained with hydrophobic compositions. Coloring of steam insulation will be applied to the lower surface of the assembled flooring.

The application/use of plate/slabs from cellular/honeycomb and other lightweight concrete makes it possible to combine in one cell/element carrying and heatproof functions and to considerably

lower the building labor consumption of the device of roofs. In certain cases for these target/purposes, are applied complex articles made of finned reinforced-concrete plate/slabs with those plotted/applied on them under plant conditions vapor- and thermal insulation, by tie piece and the lower layers of carpet.

The reinforced-cement plate/slabs of double curvature are manufactured from ungravely concrete and are reinforced in the tension area of longitudinal fin/edges by prestressed rod hot-rolled steel, and in the compressed zone of plate/slab - by two woven steel meshes from cells of 7x7 by mm, attached to "basis" - to mesh from three-millimeter wire from cells of 400x400 mm. The application/use of reinforced-cement plate/slabs considerably reduces the dead weight of roof, which is especially important for the overlap of large flight/spans.

Flooring from the reinforced-cement plate/slabs of double curvature is stained with water-shielding composition and is warmed by fixed on kapron knob/buttons matte finishes from stock of fiberglass. For steam insulation the emerging into location surface of matte finishes is pasted over by glass cloth and is stained with enamel or oil paint. The edge of the water-insulating carpet of trough abuts on concrete and thoroughly it adheres on the extreme plate/slabs of flooring.

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To the parts of the device of roofing, besides mentioned above troughs with the arranged/located along them waters intake, are related transverse and longitudinal deformation welds, contiguities to parapets and walls in the places of jump/drops in the heights and to the produced to roof ducts.

Deformation welds are made without cutting of carpet. Transverse - on cylindrical compensators made of the zinc-coated roofing steel, longitudinal with inset - on steel cylindrical panels. Within the limits of weld under basic carpet, they are packed the zinc-coated roofing steel, the layer of ruberoid it is dry even three layers of glass cloth on mastic.

In the places of contiguity to the emerging on roof walls, the carpet smoothly is turned on concrete 0.1 m in wide, is covered with coating made of the zinc-coated roofing steel and at height 0.25 m it is fastened under the steel angle iron, adjusted on dowels. On width 0.5 m the carpet is strengthened by the smoothly broken additional layers and is covered within the limits of trough by ground into mastic gravel.

Insets in the places of jump/drops in the heights overlap steel with the panels, intensified by one or two longitudinal stiffening ribs. They rest on adjusted by dowels to the end/faces of the extreme plate/slabs of the flooring of arm from rolling angle irons. Roofing in the place of jump/drop abuts the brick rim. The slot between the rim and overlying wall overlaps with compensator and the aprons made of the zinc-coated roofing steel, attached under the steel angle iron, adjusted on dowels.

Holes for the passage of conduit/manifolds, ventilating shafts and others are guarded by reinforced-concrete block. Carpet adheres on the branch connection, which is increased on 0.4 m above the level of roofing. The clearance between the branch connection and the passing in it duct is covered with hood made of the zinc-coated roofing steel.

Face side of parapet panels is covered with the apron made of the zinc-coated roofing steel, attached on adjusted by dowels "spikes."

Roofings from corrugated asbestos cement sheets, the covering single-span unheated buildings with free drain, are given to sheet 53.

Sheet 63. Light-aeration lamp/canopies.

Lamp/canopies (apertures in coating) are applied for natural illumination and the aeration of the predominantly average flight/spans of industrial buildings. According to their designation/purpose they are subdivided into light-areation, aeration and light, while on arrangement relative to the flight/spans of building - to longitudinal and transverse.

The longitudinal light-aeration (seriesPK-01-126) and aeration (series PK-01-36) lamp/canopies with the lantern farm/trusses, adjustable by rafter constructions, are unitized for sloping roofings. Their axle/axis coincides with the horse of flight/spans.

Transverse lamp/canopies it is expedient to apply with the coincidence of the plane of glazing with the plane of the trusses, for example in sheds above the cylindrical shells of double curvature and in other cases, characteristic for the adopted system of coating. Glazing light-aeration lamp/canopies is single.

Light zenith lamp/canopies with double glazing in the plane of roofing possess greatest light activity and they are applied at

present in experimental order.

Light-aeration lamp/canopies 6 m in wide, used above flight/spans 18-30 m, and width 12 m, used above flight/spans 24-36 m, are formed by the local lift of roof to the lantern farm/trusses, which build up rafter constructions. The longitudinal vertical apertures of lamp/canopies are filled with side panel and steel interlacings with the angle of opening to 70°; end-type walls - asbestos wood panels or corrugated asbestos cement sheets in unheated buildings.

The height of lantern farm/truss in the plane of glazing is composed of the height of rim (0.85 m of the top of rafter construction for all types of lamp/canopies) and of the height of the vitrified aperture (1.5; 1.75 and 2x1.25 m with the width of lamp/canopy 6 m and 2x1.25; 2x1.5 and 2x1.75 m with the width of lamp/canopy 12 m).

Drain from the coating of lamp/canopies external - with gradient/draft in 1:12 and internalizations - with gradient/draft into 1:8 (only for width 12 m). The longitudinal stability of lantern farm/trusses is provided by the rigid disk of the monolithizedd coating whose plate/slats are welded to lantern farm/trusses not less than at three points each, and by steel communication/connections,

establish/installed in extreme cells, in the planes of glazing and upper belt/zones of lantern farm/trusses. Before welding of plate/slabs, series lantern farm/trusses are linked by inventory assembling spacers.

The interlacings of lamp/canopies are welded from steel hot-rolled or bent profiles according to GOST 7511-58 (series PR-05-31). Each interlacing is hung on two hinge joints to the drive/girder of glazing. Hinges are equipped by the clamping fixture, which limits the angle of opening. With the step/pitch of rafter and lantern farm/trusses 12 m, the drive/girders of glazing are fastened to the intermediate steel strut, which rests on side panel and the fin/edge of flooring slab.

The opening of interlacings is realize/accomplished by the mechanism, which operates not more than 18 flaps, arrange/located in one, and 26 flaps, arrange/located in two tiers. Depending on the season and conditions of airing, the mechanism can be establish/installed to the angle of opening in 25, 50 and 70°. Separate interlacings can be open/disclosed by hand.

Light-aeration lamp/canopies can be used as exhaust and supply device. In the first case they must be those nonblown - those shielded from head wind. In multispan buildings the lamp/canopies of

equal height shield each other. Their turned inside apertures can be considered nonblown, if the height of lantern farm/truss is more than 1/5 width of interlight space.

For protection from the blowing out of external windward apertures and apertures, adjacent to the end/faces of lamp/canopies, are established longitudinal windward panels from the steel framework/body, sheathed by corrugated asbestos cement sheets. In other cases can be provided for the anechoic glazing of these apertures, if the remaining shielded apertures provide the distance/removal of the necessary quantity of air. In certain measure prevent blowing out wind panels - anechoic vitrified framework, adjustable after the open/disclosed interlacings of the end/faces of lamp/canopy.

To operational shortcomings of light-aeration lamp/canopy, one should relate the intense contamination of glazing.

Sheet 64. Aeration lamp/canopies.

Of aeration lamp/canopy the upper-suspension vitrified interlacings are replaced by low-suspended windshield panels, which exert with opening by 60° small resistance to current of vented air. For the protection of room from the oblique rain, falling/incident at

angle to 30°, the on-board plate/slabs of flooring on lamp/canopy are advanced and form the deflector above the aeration aperture.

The productivity of lamp/canopy is determined by the height of aeration aperture, accepted in standard projects in 1.25; 1.7; 2.4 and 3.4 m. Lamp/canopy settles by sections up to 80 m in long with the fire breakage between them. Section can be cut by deformation weld to two section with the independent mechanisms of opening. In this case of deformation weld, is established its overlapping anechoic panel 6.5 m in long with end-type triangular panels.

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The detectable after weld panel is respectively shortened to 5.5 m. Anechoic panel guards place for the advancement of stand of the mechanisms of opening. In the end/face of lamp/canopy, this place is guarded by special bellows. For protection from blowing out end-type walls cover the dimensions of opening. In them are placed the doors for an access to mechanism.

With blackout in the upper part of the aperture, are establish/installed masking panels, and the angle of the opening of windshield panels is limited to 43°.

End-type walls and panels, windshield and masking panels are made of fibrous asbestos cement sheets, nailed to the wooden bars, connected with steel framework/body.

The farm/trusses of aeration lamp/canopy differ in terms of the presence of the extension, necessary for the suspension of windshield panels and the support of the advanced on-board plate/slabs.

Mechanism for the opening of windshield panels is analogous in its device to mechanism for the opening of the interlacings of light-aeration lamp/canopy.

Sheet 65. Light lamp/canopies.

Light zenith lamp/canopies are included in the flooring of coating in the form of the special thickened reinforced-concrete plate/slabs with apertures by size/dimension to 1.5x1.5 m, by the covered double cupolas from fiberglass or transparent plastic, and in the form of the translucent glass-reinforced-concrete and glass-plastic plate/slabs, interchanged with reinforced-concrete plate/slabs.

Cupolas are blown out from laminated fiberglass or plastic, they are cemented and screwed in pairs on wood screws to the heated beaker/sleeve, which frames light hole in plate/slab. The joint of cupola with beaker/sleeve is packed by the cushion. On the internal perimeter of joint, it passes the groove, in which collects the condensate. Beaker/sleeve approximately 0.25 m in height can be from the reinforced-concrete panels, pasted over by semirigid wood-fiber board, or it is modeled from lightweight concrete.

The frame of glass-reinforced concrete plate/slab collects from

the reinforced-concrete panels, connected in angles during welding of laying cell/elements. In groove/slots on face side of frame, is establish/installed and is shot on dowels steel grate - crossed from cells of 200x200 mm or only from cross-beams with interval of 200 mm.

Grate is fulfilled from ts-section, used in the lantern interlacings, framed by angular-kilcohm 35x4 mm. Glass blocks are packed to the flanges of grate. The welds between them are filled hydrostable mastic with the packing of heater - bituminized slag cotton. The elastic articulation of glass blocks in panel eliminates their damage during thermal strains.

Transparent plate/slab 1.5 and 3 m in wide consists of the monolithic glass-fiber-reinforced plastic, stuck on epoxy glue to steel frame. Monolithic glass-fiber-reinforced plastic with calculated by span of 1.5 and 3 m represents by itself hollow plate/slab with fin/edges in the working direction between upper and lower layers. Thickness of all cell/elements of plate/slab 2 mm. Depending on flight/span the height of plate/slab 50 or 65 mm and the interval between fin/edges 150 or 200 mm. Frame is warmed by particle board.

Transparent plate/slab is establish/installed to reinforced-concrete plate/slabs and is fastened with welding frame

with laying cell/elements in flanges. Water-insulating carpet be cranked up under the framing angle iron of welded frame. The clearance between the flange of angle iron and carpet is filled with hydrostable mastic.

The construction of transparent plate/slabs provides for their certain increase above the plane of roofing, which facilitates the flow of rain and thaw water.

The shown on sheet constructions are developed in the volume of designed propositions by the laboratory of the transparent enclosure/protections of TsNIIpromzdaniye.

Sheet 66. Partitions.

The partitions, used in industrial buildings, are subdivided into those fencing off - those sealing into the isolatable locations (tool cribs, storages, etc.) - and separating completely separating rooms with different production conditions/modes and preventing the propagation of harmful isolation/liberations (humidity, gas concentration, etc.).

The fencing off partitions are fulfilled from steel panels whose nominal width is 0.5 and 1 m and whose height is in 2.8 m. Connection

of panels is welded from rolling angle irons. Lower part is filled with the steel or aluminum plates, riveted to framework/body; upper - by a steel mesh either by the common or reinforced glass. In assembly enter series panels 498 and 998 mm in wide, panels for contiguity to struts 973 mm in width, panels with distributing windows and two-floor and one-floor doors.

During adjustment the panels are fastened to sex/floor by anchor bolts and propped against each other. In intersections and of the distributing windows between panels are establish/installed strut-inserts section/cut 50x50 mm, weldable from brackets 45 x 4 mm. Through every 6 m on dead sections and along both sides of door panels are establish/installed carrier struts with section/cut 50x112 mm, weldable from angle irons ~~[illegible]~~ 100X63X5 mm with the trimmed flange and resting at depth 0.2 m by steel crosshead or concrete foundation.

In order to avoid the damage to the construction of sex/floor, carrying struts on anechoic sections can be replaced by strut-insert/bushings with fixed to them stiffening ribs from panels 0.5 m in wide, arrange/located perpendicular to the plane of partition.

If necessary, the fencing off partitions are supplemented by the overlap by flight/span to 6 m from steel drive/girders and beams with

the filling with mesh panels.

The partitions to the height, on 0.6 m the lower altitude of basic column, they are fulfilled from reinforced-concrete panels. In this case can be used the finned wall panels for unheated buildings, pasted over from the side of fin/edges by flat/plane reinforced-cement or asbestos cement sheets, and flat/plane reinforced-concrete panels whose nominal length is 6 m, whose height is 1.2 and 1.8 m whose thickness is to 0.12 m.

Dividing panels are fastened to basic and frame columns of analogous with fastening wall panels.

Steel frame columns welded or from rolled sections, are establish/installed within 6 m, they are embedded into the underlying layer of sex/floor or special foundation, hinged they rest on the rigid disk of coating and are untied by the spacers through 6 m on height.

Above reinforced-concrete panels and in the level of the trusses of partition they are fulfilled from corrugated asbestos cement sheets on the connected with farm/trusses steel framework/body.

The partitions, which pass along the crane beams in the level of

the crane arms of basic columns are above, they are fulfilled from finishing panels. The latter can be designed from the lumber, sheathed from two sides by flat/plane asbestos cement sheets. The places of the contiguity of finishing panels to the constructions of building are covered with steel aprons.

In the sealed single-story buildings with suspension ceiling and in the multistory buildings are applied separating partitions with the metal frame, filled by sheet materials.

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Framework/body of steel tubes or aluminum pressed profiles consists of the struts, arrange/located with step/pitch to 2 m, and horizontal spacers. It can be connected with construction of sex/floor, is suspend/hung from adjustment dowels cell/elements to ceiling or attached to support on struts with a spring-spiral fastening without the surface damage of sex/floor and ceiling. Fastening of support is rational if necessary for changes in the planning of locations.

Laminated filler - glass, flat/plane asbestos cement sheets, particle boards, hydrostable plywood, vinylplastic and the like - it is fastened to framework/body by means of the rubber, pinched by

plastic lock airfoil/profile or is establish/installed on mastic and is pressed by the alumirum molding/bar, attached on spring cramp irons.

Sheet 67. Staircases.

For report/communication with the built-in bookstands in pavilion assignments, can it is applied reinforced-concrete staircases. If the framework/body of bookstand is assembled from the standardized cell/elements of the multistory buildings on series II-20, then also built-in in it staircase is fulfilled on the same series, analogous given to sheet with 19.

On the sheet in question in addition to previously given material, is shown the laying out of the locus of step/stages and the version of the construction of composite reinforced-concrete staircases with cutting while under power and area/sites.

The laying out of the locus of step/stages is produced graphically in this sequence. The height of decks is divided into range of marchs (1.2m), and will be applied the levels of area/sites. For determining a quantity of step/stages, the lift of march is divided into the height of riser (1.2 m: 0.15 m = 8). Upper riser belongs the frieze arranged/located in level area/site, step/stage.

The others determine a quantity of treads, and thereby also the projection of flight (8-1)x0.3 m = 2.1 m.

The projection of flight is furnished into the middle of stairs shaft/mine and is subdivided by those design/projecting treads. On each pad, after eliminating upper, is set aside the width of frieze pass through, to condition taken to equal to width series pass through. Then the boundary/interfaces of the projection of march, including lower frieze tread, are connected by inclined line - forming flight. The horizontals carried out through the points of intersection by generatrix of march with by those design/projecting treads, determine their position.

Treads are limited to rises. For certain increase in treads of risers, it is fulfilled with gradient/draft 5:1-3:1. The inclined line of the projection of riser must intersect with that design/project pass through on the middle of its height. Thus are aligned the size/dimensions of upper and lower frieze treads.

The given cutting of staircases on flight and platform somewhat facilitates these cell/elements with respect to the bent marchs because of the decrease of flight/span. At the same time complicates the construction of stairs shaft/mine by the introduction of the bent beams in the plane of open longitudinal face.

The open steel official staircases are utilized for report/communication with service platforms of aggregate/units within building and for emergency exits. They/are designed from the marchs, connected with gangways into the bent cell/element by flight/span to 6m. These bent flights rest on steel framework/body or reinforced concrete floor/coverings.

Gradient/draft of marchs 45 and 60°. Width of marchs and gangways 0.6; 0.8 and 1.0m (latter only for gradient/draft of 45°). Lift of marchs with interval 0.6m to 4.2m for gradient/draft of 45° and to 6m - for gradient/draft of 60°.

The bridgeboards of marchs are fulfilled from channel type bent airfoil/profile according to GOST 8278-63. The butt end of the bridgeboard has the horizontal cut, to which is welded the pressure pad; upper - the vertical cut, to which is welded supporting/reference angular-to. This configuration of bridgeboards allows: to unitize initial and average flight, to vary the position of lower supporting unit relative to the edge of area/site and to rest is direct for reinforced concrete floor/coverings. Welding marchs with gangways is fulfilled by means of finising cell/elements.

Height of step/stages 200 mm in marchs with gradient/draft of 45° and 300 mm in marchs with gradient/draft of 60°. Step/stages and area/sites can be made three types: from the cut and drawn sheet by thickness 5mm, from riffled iron 4 mm in thickness and finned from band 40x4 mm.

In step/stages from the cut and drawn sheet, the fold is made on nonbreaking through part, and for welding with bridgeboard to the cut part, they are welded from below plate/bar. Finned projections (on sheet are not shown) they prevent the formation of glaze and are applied predominantly in external staircases.

For incidental single lifts can be used vertical steel stirrups by width 0.6m, by range from 2.4 to 6m. The bowstring of u-bolt is fulfilled from angular-kA 75x6 mm. Step/stages invoice of one rod by diameter 18mm. Step/pitch of step/stages 300 mm. Fastening u-bolts during welding to upper area/sites - through bolsters, to lower - through the face plates.

At range from 4.2 m of u-bolt, they are supplied with enclosure/protection.

Sheet 68. Hems.

The structural solution of sex/floor in the greatest measure is connected with the concrete/specific/actual destination of production section. Therefore on the individual sections of building, are made different in construction hems.

In general form of the hem of production, consist of coating - upper layer, which directly undergoes all operational effects, and the underlying layer, receiving mainly vertical loads and which transmits mainly vertical loads and that transmitting them to basis/base - soil, which is found in natural state. In a series of the cases, the coating and the underlying layer are combined in one structural cell/element (earth and concrete hems).

Depending on production conditions/mode by coating it is absorbed the effect: mechanical - weak (manual trucks rubber-tired), moderate (wheel transportation) and considerable (tap/cranes crawler-mounted, the shocks of the falling/incident object/subjects); thermal during heating from 100 to 1400°C and from the wetting of liquids, including aggressive with respect to a series materials.

Coating is fulfilled from monolithic (gravel-clay mix, concrete, asphalt, plastic coating, clothing, etc.), roll (relin, linoleum) and piece materials (block, clinker and clay brick, the cast iron ceramic, glass-plastic, wood-fiber, rubber slabs, cement-sand,

concrete slabs, etc.).

In passages are applied the coatings, analogous road, well resisting loads from wheel transport; in the blasted buildings of work areas - warm and elastic clothing; under the influence are high temperatures - thermoresistant, in humid locations - waterproof, and under the influence of acid - acid-resistant materials.

Under the constant influence of liquids to coating is given the gradient/draft to ladder or drain tray/chutes to 3o/o. if necessary for periodic washing - to 5o/o, and for the special cases - to 7o/o. Depending on intensity and the acidity of wetting, subcoating is packed the coating, backing or plate-backing of waterproofing. Coating of waterproofing will be applied of two layers or tarry bitumastic; backing - of two-three layers of roll materials to corresponding mastics. From the effect of acids, backing of waterproofing is protected by the ceramic or stoneware slabs, packed above it in the solution of water glass.

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Between different coatings are establish/installed the bordering racks, angle irons or borders from concrete. The place of the contiguity of sex/floor to wall is covered with wooden, solution or

plate is smoothed off.

The underlying layer is selected depending on the constructions of coating, value and character of those received by it loads and the densities of the which forms basis/base soil. It provides the stability of coating and distributes concentrated loads. With dense soils and coating from piece materials, can be made the friable underlying layer from sand, slag, crushed stone and the like; with soft ground and monolithic or roll coatings - rigid from different concrete.

Coatings from piece materials are packed to the rigid underlying layer on the linking, elastic layer from sand, either tarry bitumastic, cement-sand mortar or the acid-resistant solution of water glass. In sex/floors on overlaps, the underlying layer frequently consists of sound- and heat resistant bulk materials whose surface record/fixes with bituminous or cement tie pieces.

Anticapillary waterproofing is packed under the underlying layer in the zone of the elevation of ground water. It consists of the cast asphalt concrete or the bitumen, spilled on that rammed into soil crushed stone.

For the purpose of the acceleration of the production of

installation works and adjustment of machine tools and another equipment up to 15 t in weight without special foundations, are used "power" underlying layers, made from monolithic concrete of brand 200-300 up to 200 mm in thickness or from composite reinforced-concrete plate/slabs by nominal size 3x6x0.12 m.

Composite plate/slabs are reinforced with the consumption of steel from 55 to 95 kg/m³ and are molded from concrete of brand 300. They are packed to the rolled soil on leveling sand layer, packed then by vibration. In order to avoid the disturbance of the elasticity of basis/base with the contact of plate/slabs with the edges of subcolumns, near columns are provided for monolithic sections. Plate/slabs with more intense reinforcement are packed in the zone of the work of erecting cranes.

In spite of certain rise in price of the construction of sex/floor with the device of the underlying layer from composite plate/slabs, is reached economic effect because of the acceleration of the input/introduction of object into operation.

The equipment, adjustable to the power underlying layer, is fastened to to glue or the self-anchored bolts, cranked up into the drilled on place holes.

The shown type of bolt is anchored into concrete because of the thrust of the wedging insert/bushings by the conical part of the rod with screwing in of nut. It is developed by the scientific research institute of reinforced concrete.

The device of sex/floor comprises to 20o/o of cost/value of the erection of the single-story building, and the consumption of concrete to hems to 40-50o/o of overall consumption of concrete. This is why when selecting of constructing the sex/floor, besides satisfaction technological requirements, one should consider economic effect from the acceleration of the production of works, service life and possibility of the unimpeded rearrangement of technological equipment. In this respect most progressive are the hems with the application/use of large-size reinforced-concrete plate/slabs and synthetic materials.

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Part Two.

INDUSTRIAL CONSTRUCTIONS.

Industrial constructions are very varied and are specific for different in technology productions. The total cost/value of their

building in a series of the cases is close to the cost/value of the buildings of industrial complex, and the complexity of their erection almost always exceeds the complexity of the erection of the latter. In other words, construction structures of industrial constructions have large economic significance and are develop/processed on the basis of the solution of special engineer missions.

Following by the unification of the industrial buildings of the series leading design institutes is carried out the joint operation on the interbranch unification of industrial constructions. In it enter: the selection of the most widespread forms of constructions, the development of their overall circuits with gradations for power, subordinate to modular system and allow/assuming the repeated application/use of uniform cell/elements, and construction of cell/elements themselves.

Bringing below examples do not pretend to generalization, systematization or the presentation of questions of the unification of varied industrial constructions, but have by their target/purpose of showing modern methods of construction construction in this section of industrial complex. They encompass common/general/total for a series of the productions of the group of the industrial constructions, utilized for displacement/movement (communication) and storing (capacitance/capacity) of raw material and finished product.

The constructions of these groups are divided in terms of the affecting the structures parameters - to physical state of the content (friable, of liquid, gases) and the arrangement of constructions relative to ground level (ground-based, sunk).

The drawings of the book illustrate a series of the standard or experimental projects, developed by the leading Soviet planning organizations and used in construction. The placed in them structural/design methods of the application/use of steel, composite prestressed reinforced concrete and other progressive materials are based on the possibilities of the industrial base, common/general/total for entire industrial construction.

Hence appears the known generality between the constructions of industrial buildings and constructions, which brings where this is possible, to the use of the uniform standardized cell/elements (columns, beams, ribbed slabs, etc.). Development of this generality in academic and real design - one of the prerequisite/premises of further reduction in the cost/value of building.

Structural/design system of each construction depicted in question in the axonometric cut/section, filled with basic parts and

the units of the couplings of composite cell/elements. Drawings are accompanied by short explanatory text with indication of the methods of erection and assembly, inseparably connected with the used constructions, and the table of the consumption of materials. The given in Table 3 application/appendices data help to compare the examined constructions between themselves and with the new versions, obtained in summation, of academic planning of versions obtained in summation, of academic design.

Chapter 7.

COMMUNICATIONS.

In this group are included conveyor tunnels and galleries, widely used at all enterprises connected with obtaining and processing/treatment of carbon, ores, non-minerals and to that of similar bulk materials; water lines and saltpan - compact cooling devices, utilized in the reverse systems of technical water supply, and the plant ducts, intended for the outlet of the contaminated air, fume and explosive gases.

Conveyor tunnels and the analogous by it underground communications of various kinds at present, as a rule, are fulfilled from the precast reinforced concrete, which considerably simplifies and accelerates their device.

Galleries consist of supports and span structures with the carrying and enclosing constructions and they can be subdivided depending on the passage of the conveyor on top or of low frameworks. In the first case the enclosing constructions of span - structure build a superstructure themselves above carriers, in the second -

partially they are combined with them as fillers or are united completely in box systems. The critical angles of the slope/inclination of span structure it depends on the kind of load and surfaces are flight and are from 16 to 22°.

The conveyors, utilized seasonally or with mild climate, can be installed on the open piers. Galleries for dry loads they are arranged without heating in the presence of frost-hardy film/strips. For other loads heating steam or air taking into account calculated temperature of +5°.

In galleries carried out with the application/use of inflammable materials, through every 100 m are arranged flameproof fire-fighting zones with output/yield to the incombustible staircase.

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The width of gallery in world/light is composed of the total width of conveyors and passes between them. Width of conveyor belt 600-2000 mm. To each conveyor is provided the bilateral approach: on the one hand - during its motion from 650 mm in width, on the other hand - with its repair from 500 mm in wide. The passes between two conveyors are received as width from 1000 mm. The height of pass 2 m. On inclined sections in pass, are nailed the plate/bars or are

eliminated step/stages.

As supporting constructions of the span structure of galleries, are applied steel farm/trusses by flight/span to 30 m, reinforced-concrete beams by flight/span to 18 m and different systems from the prestressed reinforced-concrete cell/elements, including box of gallery with steel strut frame. In the highly placed galleries the most economical solutions are achieved by large span constructions. The characteristic constructions of supports and carrying and enclosing cell/elements of the span structure considered is based on the specific examples (see sheets 70-72).

Guards consist of water distributing and sprinkling device, water-collecting basin and exhaust tank or its replacing diffusor with installation in it of fan of the suction action. Heated water is supplied on main-line tray/chutes into working tray/chutes with the bottom holes into which are inserted "hydraulic" nozzles. The escape/ensuing from cap/fillings water jets are spattered from those suspend/hung under them flanges into the "flame" of drops, falling/incident to the panels of sprinkling device and cooled by contrary draught. The cooled water collects in the arranged/located in the base of saltpan water-collecting basin.

The main-line and working tray/chutes of water distributor

consist of composite reinforced-concrete cell/elements. Step/pitch of working tray/chutes 1-1.2m, of hydraulic cap/fillings with sprinkling flanges 0.4-1 m. In certain cases water-distribution grid/network is installed from steel or asbestos-cement ducts. In circular tanks the tray/chutes are furnished along radial or rectangular system. The first creates the best aerodynamic conditions, the second is reduced the number of typical dimensions of the composite cell/elements of water-distribution and sprinkling device.

Airstreams enter exhaust tank through the air-supply windows, overlapped sometimes by panels. The located under sprinkler wind partitions prevent through insufflation and direct air jets to the tower of saltpan. The thrust/rod of air depends on the aerodynamic properties of tower.

The best aerodynamic properties possesses shell in the form of the cut of the surface of hyperboloid of one sheet of the rotation/revolution where is throat circumference it is arrange/located within the limits of 3/4-4/5 heights. Certain simplification in the form of shell during an insignificant reduction in the lift-drag ratios is achieved by the application/use of biconical, conical and cylindrical surfaces of revolution.

For the reinforced-concrete cell/elements of saltpans, is

applied frost-resistant hydraulic engineering concrete of brand 200 in foundations and the bottom of basin and brand 300 in above arranged/located cell/elements, which undergo alternately cooling and wetting.

For waterproofing the external surfaces of the walls of foundation are greased by hot bitumen two times; the internal surfaces of basin are cover/coated with that cast layer from cold mastic asphalt, and over it - by tie piece from cement solution or by shielding reinforced-concrete slabs. Waterproofing of basin is packed after the assembly of water-distribution and sprinkling device. Inner surface of tower is cover/coated with insulating layer (solution of bitumen in gasoline or plastering from cold mastic asphalt), protecting concrete from the effect of the condensing water vapors.

The lightning protection of tower is realize/accomplished by a system of the lightning controls, connected by the current-deflecting cable with ground outline/contour.

Plant ducts are intended for the outlet of the contaminated air, fume and exhaust gases with temperature to 500°. Using material and by construction, it are subdivided into brick, the used at the height of shank to 60 m, steel and reinforced-concrete monolithic, the used at any height of shank, and reinforced-concrete composite, used at

present in experimental order under conditions, analogous to erection from monolithic reinforced concrete.

In essence plant ducts are the separate constructions. light/lung steel tubes of shark up to 35 m in height can under certain conditions be establish/installed on the construction of building.

The separate duct by way of erection is subdivided into three basic parts - foundation, trunk and set.

The foundation of duct in the majority of the cases represents by itself the resting on reinforced-concrete plate/slab reinforced-concrete cylinder or truncated cone with beaker/sleeve in upper part for ash removal or input/introduction of flues. In especially dense soils for relatively light-density construction, can be used the circular foundation of trapezoidal cross-section. During the underground input/introduction of the flues (feeders) of the wall of the beaker/sleeve of foundation, they are protected by refractory lining. During two input/introductions the apertures into beaker/sleeve are furnished on one axle/axis, while with three - at angles of 90-135° to each other. The apertures of all input/introductions must occupy in sum not more than 40o/o cross-sectional area of the beaker/sleeve of foundation. In the

beaker/sleeve between input/introductions, are raised separating walls.

The shank of duct has the cylindrical, conical or combined shape. It includes in lower part base, ash overlap and the input/introductions of above-grade flues, but upper part - a knob/cap of duct and on entire height - a thermal insulation.

In ducts up to 100 m in high with low speed of gases and considerable precipitation of solid particles into ash overlap cuts into the hopper, which throws off ash into the body of platform truck or truck, which drops in into base deck. In the ducts of high altitude, an insignificant quantity of ash is removed through the abandonment in flues accesses.

The construction of head of duct must provide stability to the harmful effect of its enveloping gases.

At the temperature of waste gas to 100°, internal surface of shank is cover/coated with water-insulating greasing, while at higher temperature - by refractory lining. In brick and monolithic reinforced-concrete ducts the refractory lining is produced by usual or acid-resistant brick, in steel tubes - by the gunite, reinforced by steel mesh. The internal surface of composite reinforced-concrete

cell/elements can be covered under plant conditions with the heat-insulating layer of special composition (plastic-concrete, etc.).

The set of duct consists of running stairways, lightsignal area/sites for a light guard, the system of lightning protection and cap/hood of cast iron component/links, adjustable on brick or reinforced-concrete knot/cap.

Running stairway serves for lift to light signal areas. Beginning from height in 10-15 m, for safety and convenience in the use, it is supplied by guard, also, through every 10-15 m - by hinged/reversible plate/bars for a rest. Staircase is installed from component/links 2.5 m in long. Light signal area/sites are installed from the latticed steel panels, which rest on steel brackets. For the passage of the running stairways, one of the panels has the removing itself to enclosure/protection hatch. Height of enclosure/protection 1 m.

Page 36. Lightning protection consists of several lightning receivers, the current-deflecting cable (only on brick and reinforced-concrete ducts) and grounding. Lightining receivers are fulfilled from steel tube with diameter of 38 mm increasing above the knot/cap to 1800 mm. A quantity of lightining receptors is determined

from the condition that combined with them with apex/vertexes the circular cones with expansion angle in 90° completely cover/coat the mouth of duct.

The current-deflecting cable is fastened to the holders of the component/links of the running stairway, and at base it consists into steel tube. Grounding consists of oppressed into soil steel duct - electrodes 2.5 m in long. They are clogged at depth in 3m, through every 5-7 m in circumference, at a distance it is not less 2.4m from foundation. On the top of ducts at depth 0.5 m, passes the uniting electrodes busbar/tire, to which is attached the current-deflecting cable.

The economic indices, given in Table 3 application/appendices, give the representation of cost/value and consumption of the materials to of 1 m² of the surface of shank. Entire/all surface is determined from formula πDH, where H - height of duct, and D - diameter of outlet +2o/oH + the thickness of shank in the middle of the height of duct.

In ducts from the precast reinforced concrete, the savings is reached because of the decrease of the thickness of the shank, possible at the high quality of the manufactured at plant cell/elements.

Cylindrical pipes up to 60 m in high are installed from reinforced-concrete steps up to 10 t in weight.

Sheet 69. Tunnels from the precast reinforced concrete.

Composite reinforced-concrete tunnels are intended for the setting up of conveyors, device of underground crossings and for the cable laying, busbar/tires and conduit/manifolds of different destination.

The packing of tunnels is provided for in unsettled soils with the calculated impedance of $R \geqslant 1.5$ kg/cm² with the sinking of the top of coating on 0.7-2 m. The provided for by project level of ground water does not reach the top of coating on 1 m.

Tunnels are fulfilled by height in 2.1; 2.4; even 3 m, by width into 1.8; 2.1; 2.4; 3 and 3.6 m into one thread even 4.8; 5.4; 7.2; 8.4 and 9.6 m into two threads. In the latter case the tunnel is divided by conjugate intermediate struts with the step/pitch 3 m. Between struts is formed the pass 0.8 m of width.

Ducts are furnished near the walls of tunnel several tiers along

height. Ducts by diameter of up to 250 mm are packed on arm, by diameter from 250 to 400 mm - to brackets and whose diameter is it is more than 400 mm - on frame mountings or concrete pillows. Sewer systems, and also the ducts of the greatest diameters are furnished in lower tier.

Tunnels into one thread collect from the plate/slabs of bottom of chute section/cut, the ribbed slabs of overlap and wall panels. In tunnels into two threads, these articles are supplemented by the struts of rectangular cross section 0.2x0.5 m and plate/slab-insets, which overlap central gangway.

The plate/slab of bottom is packed for 100-millimeter concrete preparation, reinforced during moist soil by mesh from rods 8 mm in diameter with cells of 200x200 mm, and 30-millimeter leveling layer of sand. Within the limits of the level of ground water, is packed asphalt or backing waterproofing. Above reinforced-concrete preparation it is shielded by the layer of cement mortar, and with the face of wall panels - by walls from the brick of brand 100.

During rotations and in the broadening of the tunnel of bottom and wall reinforced-concrete monolithic, the overlaps are composite with the connection/inclusion of finishing plate/slabs and beams. The inspection accesses, arrange/located with the steam lines through 100

m, with the cables through 150 m and with the water pipes through 200 m, are eliminated through round holes in the plate/slabs of overlaps. The wells above manholes collect from reinforced-concrete drums.

Tunnel is installed by self-propelled tap/crane by the load capacity 10 t, which are moved on edge or bottom of foundation area.

The accuracy/precision of the setting up of the wall panels before consolidation is checked by template/pattern.

The joint of wall panels with the plate/slab of bottom rigid. Greatest weight of assembling cell/element 6.8 t.

Sheet 70. Gallery on the steel, arranged/located outside farm/trusses by flight/span to 30 m.

The load-bearing frame of the conveyor galleries in question consists of steel farm/trusses by flight/span 18; 24 or 30 m and columns - reinforced-concrete up to 14 m in high and steel - larger height. Those enclose structures are assembled from standard reinforced-concrete plate/slabs, light-concrete wall and wooden or steel window panels.

In walls and the coating of galleries, can be used asbestos

cement articles. The width of galleries in world/light is accepted multiple of 0.6 m to 6 m and multiple of 1.5 m - with larger width.

The external arrangement of farm/trusses free/releases opening and simplifies purification/cleaning galleries. The careful purification/cleaning of galleries is especially essential in the transportation of the dusty dangerously explosive materials. During the reliable waterproofing of sex/floor, it is fulfilled by the washing of dust and spillage.

The internal arrangement of farm/trusses is applied with the aggressiveness of atmospheric residue/settlings.

Split steel farm/trusses with parallel belt/zones and triangular type grate by height for all flight/spans 3.2 m on the pickaxes of angle irons (2.3 m - the free height of gallery +0.3 m - the dimension of industrial wires +0.6 m - the height of the constructions of sex/floor and roof) are connected by steel beams in the units of lower and upper belt/zones. The stability of the cross section of gallery is provided by the rigid connection of subsupport struts of farm/trusses with the beams of coating.

In the forming supporting frames are leaned longitudinal steel communication/connections, arrange/located in the plane of upper and

lower belt/zones.

Belt/zones and subsupport struts of farm/truss - t-beamed section/cut, welded or from rolling angle irons; the rods of grate - cross-shaped section/cut, from rolling angle irons. The attachment of supporting unit is produced on unfinished bolts with the subsequent assembling welding of horizontal base plates.

Reinforced-concrete columns up to 14 m in high are made in the planking of the standard columns of industrial buildings. During the assembly of gallery, they are furnished in the plane of farm/trusses and are connected between themselves by steel crossed communication/connections.

Foundations reinforced-concrete composite with glass type bases.

On the last/latter indications of the strut of the supports of galleries without depending on the width of the latter, they are furnished in the plane of farm/trusses.

Steel supports are linked with monolithic reinforced-concrete foundation by the anchor bolts, passed through base plate.

Intermediate steel supports of gallery - pendulum type. They are

calculated only for the perception of vertical effort/forces and do not prevent longitudinal thermal strains the anchor (fixed) supports of the inclined galleries of small extent are formed in the lower unit by the continuous footing. The galleries of large extent are divide/marked off into temperature sections. On the joint of sections, are establish/installed the anchor poles of triangular configuration in the plane of farm/trusses.

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Sheet 71. Gallery of the intensified by rod with square cross section from U-shaped reinforced-concrete cell/elements of span up to 24 m.

The span structure that examine/considered gallery collects from the 12-meter reinforced-concrete cell/elements of top-hat, establish/installed to each other by expansion/disclosure inside. The plate/slab of U-shaped cell/elements is intensified by the directed downward fin/edges which can be developed with an increase in the width of gallery. The longitudinal joints between cell/elements are realize/accomplished during welding of laying brackets with the arranged/located along inside cover plates. Hinging of joint is provided by elastic wood packing.

Twenty-four-meter span structure collects of two 12-meter ducts,

intensified those arrange/located within the limits of interior height by eight prestressed tightening from wire-rod bundle or rod high-strength reinforcement. Tightening are tightened by jacks "to concrete" and are protected from corrosion by ring from a cement-sand solution.

The concrete sex/floor of gallery is packed on the heated layer of slag concrete. For fastening of the mounting of conveyor into sex/floor, are laid two wooden seminary. Walls are warmed from inside by slag wool and are lined with flat/plane asbestos cement sheets. Coating is warmed by cellular concrete in 500 kg/m³ specific weight and is pasted over on cement tie piece ruberoid carpet.

Composite reinforced-concrete supports. H-shaped, by height to 14 m, with the packed or top cantilever cross bars. They can be also made from the crane part of two-branch columns, establish/installed in the plane of the walls of duct and connected steel communication/connections.

The setting up of span structure in total up to 100 t weight to supports is realize/accomplished by several self-propelled tap/cranes or leathers. Assembling fastening - during bolts and welding with the established/installed on supports "irons". The cost-effectiveness/efficiency of construction is reached because of

the coincidence of the carrying and enclosing cell/elements.

Sheet 72. Gallery on composite reinforced-concrete strut plate/slabs by flight/span 12.2 m.

Gallery is intended for the fill of grain on grain-receiving point/item and will be utilized only in summer. Conveyor is shielded from rain by mounting fixture from corrugated asbestos cement sheets and by the removable panels, hung up above the rails of the open pass.

The span structure of gallery collects of two finned reinforced-concrete flooring slabs with size/dimension 1.5x6 m from that thickened to by 10 mm flanges also of four-stringed steel strut frame. Columns the reinforced-concrete t-shaped of rectangular cross section. Foundations reinforced-concrete composite with glass type bases.

The consolidation assembly of span structure, including the setting up of the mountings of conveyor, to victuals of struts from brackets and packing asphalt sex/floor, is organized on the fitting bay.

The assembly of gallery is produced by crane trucks. Strut

plate/slabs are tack/caught to the ends of columns by erection welding.

The clearance between them in the pass of gallery overlaps with panel made of riffled iron.

The cost-effectiveness/efficiency of gallery is explained by simplicity of the construction of span structure and by possibility of using the everywhere available forms during the manufacture of plate/slabs.

Sheet 73. Underground conduits from the precast reinforced concrete.

Channels from the precast reinforced concrete are applied for the technical water supply of thermal power stations from 100 to 1200 MW in power.

Channels into one thread are assembled from rectangular component/links by clearance space from 2x1.8 m to 3x42 m and 2.75 and 1.75 m in long in accordance with standard railroad dimensions. They have only transverse seams of monolithization, which undergo relatively smaller voltages.

Channels into two threads collect from plate/slabs and the wall

cell/elements of channel and double-T form 5.75 m in long. All joints of reinforcement are loop. For manufacturing of composite cell/elements and monolithization, is butting it is applied hydraulic engineering concrete of brand 300.

The assembly of channels is produced with the aid of the gantry crane by load capacity 10-20 t which by its flight/span covers foundation area with the confronting on edge transport, loaded by composite cell/elements, or tap/crane crawler-mounted. Composite cell/elements are establish/installed to concrete base on the leveling layer of cement mortar.

In channels into two threads, wall cell/elements will be unfastened by assembling struts, and flooring slabs are hung on the steel beams, passed through assembling loops and which rest on the flanges of walls.

Waterproofing internal surfaces is not provided for. Watertightness is provided by the high quality of concrete. After hydraulic testing, external canal surface cover/coat with hot bitumen two times for protection from aggressive ground water.

Sheet 74. Reinforced-concrete supports of steel above-grade conduit/manifolds.

Steel above-grade delivery conduits are used for supply are cartridge (hydraulic ash removal), water, condensate, pair, gases and the compressed air within the limits of the territory of plant complex. They consist of steel tubes with diameter of 200 mm, packed or suspend/hung from the separate supports.

The step/pitch of supports is determined by the bearing capacity of ducts and with the small and mean diameters oscillates within limits 10-25 m. It can be increased by the application/use of steel strut frames or suspensions. Conduit/manifolds less than 300 mm in diameter are packed on the cross bars which are arrange/located through 1.5-3 m on the steel beams, which overlap flight/span. The gradient/draft of conduit/manifolds within the limits of a jump/drop in the heights of columns is reached because of a change in the mark of the edge of foundation and different depth of framing.

The route of conduit/manifolds is divide/marked off into temperature sections up to 100 m in long, limited by compensators.

According to the character of loading support, are subdivided into intermediates and anchor - intermediate, end and angular. Anchor poles are calculated for the perception of horizontal effort/forces

and are establish/installed in the middle of temperature sections, on the ends of the route and on one from each side of its rotation or branching. To anchor poles the conduit/manifolds are fastened motionlessly. On intermediate supports the fastening allow/assumes temperature displacement/movements. in view of the intensive wear of the lower part of the walls of the duct of dust line, periodically they are turned. Therefore on anchor poles they are fastened by removable clamps.

Structurally, supports support are subdivided into low (above-grade height 0.9 m) and high (above-grade height 5.4; 6.6 and 7.8 m). Low inner bearings are made in the form traverse, packed prone on the sand pillow, filled instead of vegetable layer.

In the low anchor poles of traverse, it is welded to short piles or monolithic reinforced-concrete foundations according to the type of those shown on drawing).

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High inner bearings are made from T-shaped or two-branch columns, concreted in the forms of the standard columns of industrial buildings. The latter are establish/installed by flange upward or downward with traverse, welded on top. Anchor inner bearings,

receiving equalizing horizontal effort/forces, by their construction are analogous to inner bearings. End and angular anchor poles are designed from the paired two-branch columns, connected by traverses or vertical steel communication/connections.

Sheet 75. Saltpan with hyperbolic tower from the precast reinforced concrete (area of irrigation 4000 m²).

Sheet 76. Make the assembling units of hyperbolic tower.

Saltpan rests on the circular foundation of t-beamed section/cut, assembled from ribbed slabs and blocks. All cell/elements of foundation are connected during welding of the issues of reinforcement; joints are assembled in one piece by concrete of brand 200.

The carriers of the belt/zone of air-supply window - reinfoced concrete inclined columns (diameter 0.5 m length 7 m, weight 3.5 t) low are welded to steel laying plates in foundation blocks, and they are assembled in one piece on top in reinforced-concrete ring approximately 3.5 m in high forming the stable base of composite shell.

The shell of tower is separated to 7 tiers six of which - the

correct 72-angle intersected pyramids, comprised of finned trapezcidal panels 11.8 m in high. The thrcat circumference of hyperbcloid is formed by the sixth tier, ccmprised of rectangular panels. The panels of the fifth and seventh tiers are uniform. Entire/all shell is installed of 504 panels of six typical dimensicns. Finned panels are connected by welding the laying cell/elements, arrange/lccated frcm external ard inside in the angles cf fin/edges. Welded joints are sunk and are ccver/coated with consolidation with concrete. For the best cchesion/coupling with shielding concrete to assembling cover plates, are welded the cutting cf reinforcement.

On the end-type faces of panels, there are chamfered prcjections, which correspond to vertical angle of rotation, and the forming concrete keys in the side seams with mcnolithization it is butting.

The assembly of shell is conducted by tower crane by load capacity 50 t with range tc 90 m and by bocm tc 40 m, driving/moving arcund grading along rail track.

Water-distribution and sprinkling devices are carried out in water-cellecting basin 73 m in diameter on rectangular mesh 6x6 m how is considerably decreased a quantity of typical dimensions of the

drive/girders of framework/body, asbestos cement sheets and ducts of sprinkling device.

The clearances between flat/plane asbestos cement sheets are record/fixed by distance tubes from plastic.

Water-collecting basin can be divided by floors by the reinforced-concrete partition, concreted after the setting up of the framework/body of water-distribution and sprinkling devices.

The application/use of the precast reinforced concrete in saltpans allows as in other constructions, to raise the quality of concrete, to reduce the periods of erection and to get rid of seasonality in the production of works.

Sheet 77. Graduating tower with monolithic reinforced-concrete biconical tower (area of irrigation 2800 m^2).

The exhaust tank of saltpan rests on the circular foundation of the t-beamed section/cut through the latticed belt/zone from composite reinforced-concrete struts. Foundation level is normal and symmetrical to the resultant of pressure. The concreting of circular foundation and the carrier ring of shell is produced in common type wooden planking. Reinforced-concrete inclined columns (diameter 0.5

m, length 5m, weight 2.5T [redacted]) for the accuracy/precision of setting up are enlarged into triangular cell/elements with base from assembling communication/connection.

The shell of tower has alternating/variable thickness from 720 mm at height 4.5 m to 120 mm at height 66-65 m. The rigidity of shell is provided by the rings, arrange/located at the level of base, neck and outlet.

Water-collecting basin is sunk from the level of blind area on 3 m. To avoid shrinkage cracks, the bottom of basin is cut into 10 sectors by the deformation welds, filled after the shrinkage of the packed concrete.

Water-distribution and sprinkling device consists of 10 uniform sectors, assembled on by collection reinforced-concrete framework/body. Housing collects from glass type shoes, installed on the concrete surface of the bottom of basin, struts, drive/girders and beams.

With the erection of saltpan basic complexity represents the device of tower. The shell of tower is concreted in steel adjustable to the planking, hung up on are made of planks to curve pieces to steel tubular timbers.

Inventory of forest from the steel intensive ducts 40 mm in diameter, connected on the cast clamps, are establish/installed on the bottom of basin and form three-dimensional frame. The basic shank of forest/scaffolding is entered in the throat circumference of shell. In shank are placed mine hoists, installed in advance of to 4-5 sections. For the period of the concreting of the lower tiers of shell, under them is establish/installed the peripheral part of the forest/scaffolding, utilized in the future for increasing shank.

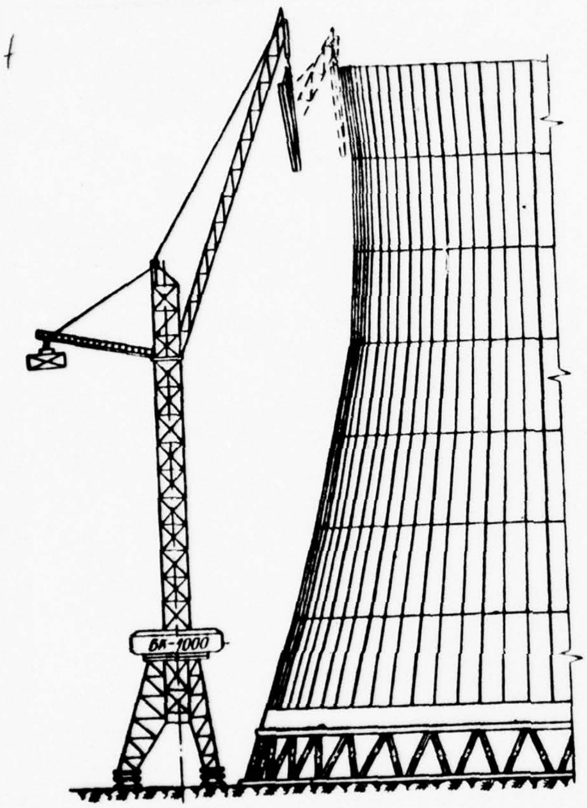

Figure. Assembly of the hyperbolic tower of graduating tower from the precast reinforced concrete.

~~end section~~.

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For the purpose of a reduction in the labor consumption of the erection of monolithic tower in 1959, is developed tap/crane-aggregate/unit, which represents by itself the variety of auto/self-lift full-turn tower crane with the bilateral arrow/pointer, equipped with mechanism for vertical and horizontal weight shifting, and with the three-tiered suspension cradles, which replace of forest in the production of works.

The portal of tap/crane is installed in the center of water-collecting basin and is fastened to basis/base with anchor bolts.

Works are conducted simultaneously in both sides at wind velocity not more than 15 m/s at the height of concreting.

The application/use of tap/crane-aggregate/unit decreases by 15-20c/o building labor consumption, cost/value and the periods of the production of works. At the same time with nearly equal metal

content (weight of steel mounting fixtures for the concreting of the tower of saltpan with the area of irrigation 4000 m² - about 230 t) tubular of forest - firm under the influence of the wind construction, which guarantees the accuracy/precision of the form of tower, and thereby also the aerodynamic properties, which are inherent in it.

Sheet 78. Saltpan with cylindrical tower from the precast reinforced concrete (area of irrigation 115 m).

The exhaust tower of saltpan in 12.5 m bore is made in the precast reinforced concrete from finned wall panels approximately 3 t in weight.

The used cutting of panels makes it possible to conduct assembly "into rack". The adjustable panel does not need brace. It immediately is welded to the half of its height with the panels of the located below assembling tier. The rigidity of shell is provided by three composite rings two of which are connected with the framework/body of water-distribution system. All composite cell/elements are connected between themselves by the means of welding the issues of reinforcement and of laying plates. Monolithization it is butting it is produced by the high speed frost-hardy hydraulic engineering

concrete of brand 300 with preliminary flushing and the cut of the coming into contact with the packed concrete surfaces.

Water-distribution device is made from steel tubes or as version - from composite reinforced-concrete tray/chutes. Main-line and working conduit/manifolds they pass along mutually perpendicular chords and are formed two separate grids, which operate the half of the area of sprinkler each. Step/pitch of working conduit/manifolds - 1 m, and hydraulic cap/fillings in them - 0.5 m. Bars with the spattering flanges are suspend/hung from steel clamps.

Tape/film type sprinkling device is assembled from latticed plank shields approximately 3.5 m in high. Under is is arrange/located separating and wind partitions. Saltpan can be assembled by full-turn tower crane by load capacity 3 t from one apron or by crawler tap/crane with 30-meter arrow/pointer.

Sheet 79. Saltpan with pyramidal tower from steel framework/body, with enclosure/protection from corrugated asbestos cement sheets (area of irrigation 1600 m²).

The pyramidal tower of saltpan is assembled from panels with the steel framework/body, sheathed by the asbestos cement corrugated

sheets of the intensive airfoil/profile.

The rectangular configuration of basis/base makes it possible to simplify and to unitize the cell/elements of water-distribution and sprinkling device, but, on the other hand, is caused certain complication of the form of tower.

The steel framework/body of exhaust tower forms square in plan/layout portal and the established/installed on it truncated octagonal pyramid. Portal rests on four foundation, arrange/located in the angles of water-collecting basin. The supports of portal are connected by the tightening, which pass on the outline/contour of the bottom of basin.

Corrugated asbestos cement sheets can be replaced in the enclosure/protection of saltpan by the plank shields, hung up to the assembled steel framework/body.

The steel constructions of tower are stained with anticorrosive composition from Kuzbass varnish and aluminum powder, asbestos cement sheets - by an aluminum color/paint two times from both sides.

Framework/body and the tray/chutes of water-distribution device are fulfilled from composite reinforced-concrete cell/elements.

Step/pitch of working tray/chutes 1.25 m, hydraulic cap/fillings in them - 0.725 m. Block type tape/film sprinkler is installed from semicorrugated asbestos cement sheets. For accelerating the assembly, semicorrugated sheets can be preliminarily bolted through packing from bars into bundles on 10-12 pcs. up to 0.5 t in weight.

For flow-rate control and the direction of the air before the portal, is establish/installed the reel with the rotary panels, assembled on reinforced-concrete struts.

Saltpan is installed by established/installed in center auto/self-lift full-turn tower crane by load capacity 10 t during the assembly of the sheathed panels or by load capacity 5 t - during the assembly of framework/body under made of planks sheathing/skin. In the period of the setting up of panel, they are braced by the tightening guys, arrange/located in radial planes. From face the assembly of tower can be produced by tap/crane crawler-mounted with the extended arrow/pointer.

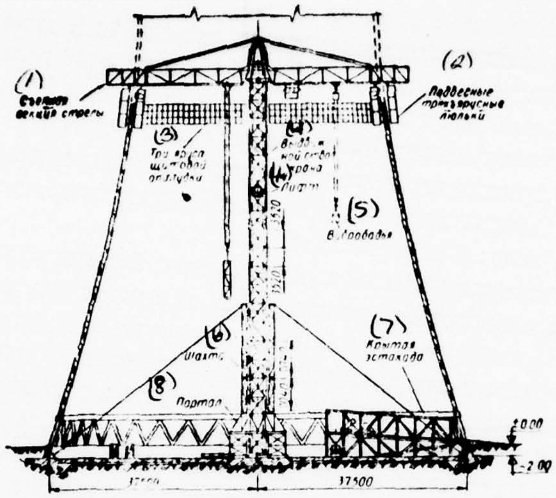
Sheet 80. Section of ventilator saltpan (area of irrigation 400 m^2).

The ventilator saltpans of large productivity consist of the repeated sections. In the center of the overlap of each section, is

arrange/located the diffuser with the fan of the suction action. For assembly and disassembly of fan in diffuser, is installed the monorail with manual "cat" by load capacity 10 t. The shown section is developed in connection with fan 10.4 m in diameter with the side shaft of drive.

The composite reinforced-concrete framework/body of water-distribution and sprinkling device in this case forms basis, also, for the enclosure/protections of section.

Vertical enclosure/protections are fulfilled from the corrugated asbestos cement sheets of the intensive airfoil/profile, suspend/hung to cross bars from bars. The lap of sheets is calculated for moistening by the from within ascending jets.



Erection of the monolithic reinforced-concrete tower of saltpan by means of tap/crane-aggregate/unit.

Key: (1). Hinged section of arrow/pointer. (2). Suspension three-tiered cradles. (3). Three Tiers of shield planking. (4). Extensible shank of tap/crane. (4a). Elevator. (5). Vibration scoop. (6). Shaft/mine. (7). Covered pier. (8). Portal.

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To avoid the infiltration of water, it is packed by bitumastic, and all the holes in sheathing/skin for the passage of fastening

cell/elements are filled up by sheet galvanized iron or are calked by the bituminized band. For corrosion protection, the asbestos cement sheets of error are stained from two sides with aluminum color/paint.

Water-distribution device from composite reinforced-concrete cell/elements with the step/pitch of working tray/chutes 1 m and hydraulic cap/fillings 0.9 m is supplemented by the panels of water-snatcher. These panels rest on working tray/chutes and represent by themselves the horizontally arranged/located made of planks louvers, which prevent the escape of water at the increased speed of air jets. For the regulating of air flow before air-supply windows, are establish/installed the reels with rotary panels.

Saltpan is installed by the tower full-turn tap/crane, which moves along sections over rail track.

Sheet 81. Steel air flue 40 m in high.

The construction of the shown air flue is analogous the construction of chimney stacks. Cylindrical shank has in lower part the conical socket, employed for an increase in the stability and decreasing the stress in supporting structures and ensuring a reduction in the resistance to motion of gases. Truncated cone is

designated so that its lower diameter would be not more than 1/12 height of duct, expansion angle is not more than 20°, and apex/vertex would be furnished not lower than the mouth of duct.

With lower diameter into 1/20 height and more steel tubes, do not require the braces. Their stability is provided by rigid fastering to basis/base.

In the shank of duct, in the place of the input/introduction of horizontal flues are organized dividing walls to height not less than two diameters of the connected ducts.

The protection of the internal surface of the shank of duct from sulfuric impurity/admixtures in waste gas is produced by acid-resistant colcring. Outside the knob/cap of duct and the cell/elements sets are cover/coated with asphalt or acid-proof varnish.

Assembling cell/elements - the component/links of duct they consist of 6-7 shells, weldable of sheet steel and connected between themselves butt or overlapping. They are intensified circular, and if necessary and by vertical stiffening ribs. The field joints of component/links are produced on flanges with the packing of asbestos sheet 5 mm in thickness, lubricated from both sides by water glass

either minium or during welding.

The setting up of duct it is desirable to produce in the completely assembled form, including to set. In this case the assembly of cell/elements is produced on the fitting bay, which directly adjoins the foundation. The base plate of lower cell/element hinged is connected with the edge of foundation. Lift is produced by the rotation of shank in vertical plane by means of the block-and-tackle whose block is attached between 1/2 and 2/3 heights of duct.

The plane of the rotation is record/fixed braking guy, which is fastened to the mouth of duct and is etched from winch with the lift of duct to vertical position.

By the constriction of the construction site, the assembly of duct is produced on component/links or from the rolled parts of the shells. In the latter case is applied the creeping tap/crane.

Steel tubes are less durable, than reinforced-concrete and brick, but the lightness/ease of construction, the speed of manufacture and assembly and the possibility of setting up during the construction of buildings determine the effectiveness of their application/use under the specific conditions of building.

Sheet 82. Steel air flue 120 m in high in carrying tower.

For the purpose of an increase of the stability in regions with seismicity, and also if necessary of applying the special expensive materials (stainless steel, plastic, etc.) the jacket of duct is hung within the carrying latticed tower of square section/cut with the dispersion of feet up to the distance, equal about 1/5 height.

Latticed carrying tower is welded from ducts or rolled sections. The field joints of belt/zones flanged, the cell/elements of grate and diaphragms - welded. The feet of tower are fastened to foundation to eight anchor bolts 72 mm in diameter. Horizontal forces are transferred to foundation by the spur, welded under the base plate of shoe.

The rigidity of system is provided by a series of horizontal diaphragms. In the lower pyramidal part of the tower of diaphragm, they are utilized for the arrangement/position of the operating area/sites whose flooring is fulfilled made of riffled iron 5 mm in thickness and is introduced into calculation for the perception of horizontal forces.

In the upper prismatic part of the tower on the perimeter of diaphragms, are arranged outside cantilever area/sites.

The jacket of duct is hung to the diaphragms of tower on circular fulcra. For the release of the thermal stresses, which appear with a considerable jump/drop in the temperature of waste gas and in the surrounding air, above fulcra are arrange/located circular compensators. Between fulcra the film of duct is intensified by heel rings with interval of approximately 3 m.

Lift on the pads, equipped with light guard, is produced on the vertical u-bolts, fixed to the constructions of tower.

Sheet 83. Chimney stack 120 m in high made of monolithic reinforced concrete.

For stabilization, the outside diameter of the base of reinforced-concrete ducts is accepted within limits as 1/20-1/12 of their height. The form of shank at height to 60 m cylindrical: at height 60-80 m - conical with the 2-percent gradient/draft of generatrix of vertical line; at height is more than 80 m - close to

fish-bellied bar, comprised of several truncated cones with building up to basis/base within the limits of 1-5o/o gradient/draft.

For providing the full/total/complete studying of concrete with needle vibrator the minimum thickness of shank is accepted in 160 mm. In the mouth of the duct it of 160-200 mm, of base at height to 100 m - 300 mm, to 120 m - 350 mm, to 150 m - 500 mm and to 180 m - 600 mm. The shank of duct is concreted in inventory adjustable to planking by concrete of brand 200-300.

For the setting up of intermediate light-signal area/sites in shank, are arranged assembling apertures by size/dimension 1x0.6 m. Subsequently these apertures are laid by brick with the plastering of external surface.

The refractory lining of shank consists of the separate belt/zones, resting on concrete arms and isolated from the body of duct at the temperature of waste gas to 150° by air gap in 50 mm, at the higher temperature - by thermal insulation layer in 80-160 mm of mineral wool matte finishes or other effective thermal insulators.

To the upper edge of the knob/cap of duct, is packed the cast iron cap/hood, comprised of melted into cement mortar component/links. Cap/hood is cover/coated with asphalt varnish and

serves for the protection of knob/cap from decompositions under the effect of atmospheric residue/settlings and aggressive impurity/admixtures of waste gas.

The external surface of the reinforced-concrete knob/cap of duct in the zone of enveloping by gases (to height to 10 m) is stained with acid-resisting enamel.

The erection of monolithic reinforced-concrete ducts begins from the assembly of mine hoist. It is installed in the beaker/sleeve of foundation initially to height 15-25 m (6-10 sections), calculated for 3-5 lifts of planking.

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During further growth the framework/body of hoist is connected by straining ties with the concreted section of shank. The lift of materials is produced in one-two cargo stands, equipped with removable ladles for concrete. In one of the shaft/mines, are installed steel u-bolts with area/sites.

To mine hoist is hung on 20 worm pulley blocks the carrying ring, which is framework/body for the flooring of service platform, the suspension of external and internal forest/scaffolding and the

adjustable of planking.

The carriers ring are manufactured with bore from 2.6 to 8.8 m. The ducts of low altitude with the laying of gradient/draft of less 2 m are raised by means of one carrying ring. For the ducts of high altitude, are applied two carrying ring with the bores, separated on 3.1-3.2 m, replaced on the specific mark.

Adjustable planking consists of external belt/zone 2700 mm in high, including 200 mm for a lap to previously concreted section, and inner belt of two tiers 1250 mm in high each.

External belt/zone is assembled from the steel rectangular and trapezoidal panels, suspend/hung to carrying ring and tightened by bolts. Belt/zone is closed in three places by final panels. The conicity of form is formed by the connection/inclusion of trapezoidal panels and is retained during lift because of the value of the setting of final and the consecutive decrease of the number of rectangular panels.

Inner belt is assembled from the steel panels, bulged out by from within circular steel rods 16 mm in diameter, placed in 4 series of clamps. The assigned/prescribed thickness of shank is record/fixed by the wooden spacers, establish/installed between the

external and inner belts of planking. Arms for the support of lining belt/zones are formed because of an increase in the gradient/draft of one tier of internal planking.

Reinforcement, beginning with vertical, arrange/located on external perimeter, is installed following by the setting up of the external belt/zone of planking. The concreting of shank is produced through gashes in the flooring of service platform with the packing/seal of concrete by needle vibrators. Concrete can be supplied to the planking of vibration scoops, transported by telpher on circular monorail.

Inspection and the trowelling of the surface of concrete are conducted after the release of planking from external and internal forest/scaffolding. For protection from the wind and the cold, service platform together with external forest/scaffolding can be covered with over-all housing from the two-layered tarpaulin, tightened along steel framework/body.

For building of large ducts, is applied united with over-all housing, mechanized service platform, called lift knob/cap.

Sheet 84. Chimney stack 180 m in high made of reinforced-concrete corner blocks.

Foundation under duct is made in the form of composite reinforced-concrete ribbed slab with cells by size/dimension in axle/axes 3.6x3.6 m. It is raised in this sequence.

On the bottom of foundation area, is arranged sand preparation. On it are expanded the reinforced-concrete plate/slabs of basis/base by size/dimension 0.3x3x3 m with the issues of reinforcement in horizontal plane. Horizontal rods are welded between themselves and with the established/installed on them vertical issues. The welds between the plate/slabs of basis/base are assembled in one piece to incomplete height, forming groove/slots 50-100 mm in high for the setting up of fin/edges.

Fin/edges are installed of the united into blocks two plate/slabs of shells by size/dimension 0.15x3x3 m each and the arranged/located between them reinforcing cages. After the setting up of the blocks of fin/edge, they are concreted by concrete of brand 150.

The cells between fin/edges are filled with soil with laminar tamping, and arrange/located under carrier ring - concrete of brand

50. For forming the ash pit of the fin/edges, arrange/located within the inscribed into carrier ring square, they have half height. After the filling of cells with soil they are covered with concrete sex/floor.

The base part of the shank with apertures for the adjacent flues is raised from monolithic reinforced concrete in adjustable to planking.

Unit of the shank represents by itself the correct truncated 18-carbon pyramid with the side of basis/base from 2.275 m at the height of 21 m to 1.3 m - at height 180 m. It is lined of seven types of the corner blocks of three-meter height, which differ against each other in terms of thickness (from 0.4 m at the height of 21 m to 0.15 m at height 93 m), in terms of the length of side (from 2.275 m at the height of 21 m to 1.3 m at height 153 m) and in terms of weight (from 13.7 t to 3 t). All blocks can be made in one form with the floating cap/cover for the control of thickness and the assembly of plug/silencers for changing the length of the sides of article.

The gradient/draft of shank on the section, lined of the blocks of one size/dimension, is formed because of the distillation of the vertical welds.

The internal surfaces of blocks are covered with the layer of heat-resistant concrete - plastic concrete, which replaces refractory lining.

The circular reinforcement, placed on entire height of blocks, will be joined in the vertical welds by the means of cover plates. The vertical reinforcement, which passes in the bend of blocks, links the belt/zones through one with the aid of the bolsters, placed in vertical joints.

Blocks are manufactured from concrete of brand 400. Joints are filled with dense concrete of the same mark/brand. Internal surface it is butting it is cover/coated with the layer of plastic concrete after the release of planking. For protection from harmful impurities in waste gas, entire/all internal surface of shank is cover/coated two times with acid-proof varnish.

The assembly of unit of the shank of duct is produced by the means of lift knob/cap by the load capacity in 40 t, equipped for lift and setting up of corner blocks with full-turn tap/crane by load capacity in 15 t. On the counterweight of tap/crane, are fastened the external suspension of forest. Concrete for filling is butting and lining materials are supplied to service platform with mine hoist, which passes within duct.

Chapter 8.

CAPACITIES.

In this group are included: hoppers and silos - the self-discharging depositories of bulk materials, which consist of capacitance/capacity with vertical walls (tanks) and the arrange/located under it bottom or funnel; the reservoirs for liquids, which are subdivided into water towers, closed the ground-based, partially sunk and underground capacitance/capacities for storing the isolated from external atmosphere liquid and the open, partially sunk sumps for purification/cleaning of the contaminated water; gasholders - capacitance/capacity for storage and distribution of gases of a constant volume with pressure to 16 ATI and alternating/variable volume with pressure in 0.4 ATI. Latter - dry with flexible rubber section and wet with gas supply through the water lock into steel bell jar with telescopic device.

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Hoppers - shallow depository with the relationship/ratio of height to the smallest diameter tanks to 1.5, are installed in

essence on the joint of the flow and periodic forms of transport, for example between the conveyor and the car. They compensate for the nonuniformity of supply or sampling of fuel/propellant, raw material, semi-finished products or assembly.

Hoppers are fulfilled made of steel, monolithic and precast reinforced concrete. In the majority of the cases in plan/layout, they have a form of close to square rectangle. Chute type hoppers have in plan/layout a form of the elongated rectangle with a series of the arranged/located along the length chutes.

For observation after the discharge of materials and stirrings of hopper, they are equipped with subhoppers, by pockets and the slots, which bare the surface of friable and decreasing the pressure of chute.

For protection from abrasion by abrasive cell/elements, corrosion by sulfides and shocks by large pieces, internal concrete surfaces are lined by steel plates, plate/slabs, old rails and stoneware casting. In certain cases of hopper, they are covered with shielding grates from the rails (see sheet 85).

Silos - deep depositories with the relationship/ratio of height to the smallest diameter 1.5 are more than tanks, in the majority of

the cases cylindrical; they are grouped in essence into the housings, intended for lasting storage of bulk materials; they are fulfilled from monolithic and precast reinforced concrete. During the association of four cylindrical silos between them, are formed the "chain wheels", utilized for the arrangement/position of staircases, filters or as additional capacitance/capacities. Four-and hexahedral jars are furnished close. To avoid the considerable bending moments in walls the length of face should be accepted to 4 m.

In silo housing several jars are united by common/general/total foundation, common/general/total walls with four- and hexahedral tanks and above-silo gallery with the falling weights by mechanisms.

Loading of silos is realize/accomplished by conveyers through hatches in overlap or by a pneumatic method or conduit/manifolds. Unloading through nozzles occurs is by gravity/of one's own accord or impelled by pneumatic method.

In order to eliminate the hovering of some materials, in Soviet and foreign building began to apply the adjustable in center banks depression - discharging ducts with a series of holes on the vertical line (see sheet 89). This duct accommodates the vertical jet of current and prevents the propagation of motion among peripheral masses. Discharging ducts it yielded positive results first of all in

granular depositories. The application/use of bulk cargos of large specific weight (cement) must be combined with pneumatic stimulation to discharge.

The angle of the slope of the walls of funnel in hoppers or the tapers of concrete in silos must exceed on 3-5° angle of friction of material about them.

Different types of artificial reservoirs widely are utilized in the utility networks, connected with the application/use of water, oil-products and other liquids.

Above-grade reservoirs are installed to tower and are covered with shielding tent. Here tower itself is the basic structural/design of cell/elements. It is fulfilled from steel, monolithic or precast reinforced concrete and brick.

Closed ground-based reservoirs are installed on sand pillow, and partially also completely sunk - are direct to the nonfrozen through soil. They consist of bottom, walls and roofs, including the system of struts, that support it. Ground-based reservoirs are fulfilled made of rolled steel constructions; sunk and underground - from the monolithic composite and prestressed reinforced concrete.

The open reservoirs are installed to soil. They consist of monolithic bottom and squeezed reinforced-concrete panel walls. For the reduction of walls by means of winding machine, composite reinforced-concrete reservoirs must have vertical cylindrical form.

The impenetrability of reinforced-concrete reservoirs is provided by quality of concrete and by plotted to internal surface insulation/isolation whose type depends on the type of the stored liquid.

Depending on overpressure the stored gases, the gasholders are fulfilled constant and alternating/variable volume. The gasholders of a constant volume represent by themselves the closed capacitance/capacities, intended for storing the compressed gases under variable pressure, the wet and dry gasholders of alternating/variable volume are separate/expanded with filling of their gases, retaining constant pressure. In wet gasholders the charging capacitance/capacity is formed by the submerged in reservoir with water bell jar, in dry - by the piston, which are moved within cylindrical reservoir and by the equipped hydraulic gate or extension rubber section.

During the manufacture of the gasholders of a constant volume, the monitoring of the material used and weld qualities is produced

according to the effective "Rules of device and the safe operation of the containers, working under pressure". Final testings are carried out by hydraulic method at the pressure, equal to 1.25 calculated.

The dry gasholders of alternating/variable volume are intended for storing purified and dehydrated gases. They consist of reservoir with movable piston. Reservoir is manufactured from rolled constructions. Is given below one of the most contemporary systems of dry gasholder, in which the seal of the coupling of piston with reservoir is provided by flexible section from the rubberized fabric, which is reversed during its motion.

The wet gasholders of alternating/variable volume are applied for storing humid gases under pressure to 400 mm of water, st. on plant bases. They consist of water tank and the advanced of it capacitance/capacity for gas. Depending on size/dimension (100-30000 m^3) the capacitance/capacity is formed by one, two or three movable component/links - by bell jar and its continuous telescopic rings - telescopes. During the supplying of gas, the bell jar is built up from water reservoir and it alternately draws out after itself telescopes. For providing the seal between movable component/links, is arranged the hydraulic gate in the form the entering friend it is grooved/channeled, filled by water. During the full/total/complete advancement of component/links, automatically is switched on the

system of gas discharge.

Pressure in wet gasholders is installed within limits from 125 to 400 mm H_2O and is regulated by the dead weight of movable component/links and by additional surcharge weight. Loads are packed on the circular pad, which goes over the roof of bell jar, and to the circular sheet, which limits from below its wall. As loads are applied concrete dummies up to 80 kg in weight. The half of lower surcharge weight can be made in the form of monolithic concrete ring. In the case of the aggressiveness of the stored gases with respect to concrete, lower loads are cast from cast iron.

The reservoirs of wet gasholders are raised made of rolled steel constructions or from the prestressed reinforced-concrete wall panels, which reduce monolithic concrete bottom.

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The movable component/links of gasholder are advanced upward on the rollers, which roll along the system of external and internal vertical guides, or they are unscrewed from the located below cell/elements, passing as fixed toward walls spiral guides between conjugate cast iron rollers.

Application/use of spiral guides gives a series of the technical and economic advantages: the exception/elimination of the system of external guides decreases the cost/value of reservoir and the consumption of steel; conjugate rollers are not dipped in water and are always available for a repair; with the bolted component/links all the construction is placed in the dimensions of reservoir and it is not separated in locality.

Wet gasholders with steel reservoir and the system of vertical guides received in recent years wide acceptance and they recommended well themselves in operation. In a series of the cases according to local conditions, the application/use of these constructions can render/show more advisable.

Gasholders 100, 300, 600, 1000 and 3000 m^3 in capacitance - single-section (without telescopes); 6000, 10000 and 15000 m^3 - two-unit (with one telescope); 20000 and 30000 m^3 - three-link (with two telescopes).

The basic dimensions of reservoirs and component/links of gasholders with different construction of guides are unitized, which simplifies the subsequent passage to more progressive system.

Sheet 85. Discharging bunker device with side car dumper.

Device is intended for unloading of carbon from railroad cars of the type "nacelle" by load capacity to 93 t. It consists of two car dumpers of side action, receiving hoppers and the arrange/located under them locations with crushers and the discharge conveyors. One Of the two aggregate/units is spare.

The average efficiency of one aggregate/unit 1000 t in hour (15 cars by load capacity 63 t), forced - 2800 t in hour (30 cars by load capacity 93 t).

Cars are supplied into car dumper and are derive/concluded from it by means of the shunting winches, establish/installed on construction. To avoid the jamming of the gates of hopper, are equipped by guards from rails from cells 0.7x0.7 m. Freezing carbon in winter period to the walls of hoppers is prevented by the heating registers, arrange/located under steel refractory lining.

Dividing wall protects spare hoppers from contamination.

From hoppers on tape/strip or plate feeders, the carbon falls into gear-disk crushers for preliminary grinding, and then crushed -

to belt conveyors of the channel of fuel feed. In the given example the tunnels for conveyers abut the location at the level of bottom with to the opposite staircase of side and emerge to surface, being furnished symmetrically relative to the longitudinal axis of construction.

In band, the average and lower regions relief mechanisms are fulfilled those opened. For the shelter of drives, winches and maneuvering equipment, are applied movable guards. Under severe climatic conditions relief mechanisms are furnished under the tent whose framework/body rests on the upper tier of construction or on the single foundations.

All the locations of relief mechanism are connected by the staircase, above which is arrange/located the control panel.

Load-bearing frame and the enclosure/protections of the locations of car dumper are assembled from the standardized reinforced-concrete cell/elements, accepted for the erection of thermo-electric powers station. Hoppers are fulfilled from monolithic reinforced concrete.

Analogous relief mechanism can be made with rotor car dumper. The mechanical feature of the rotor car dumper is simple and

economical in operation, but its construction is sunk on 15 m. Side car dumper somewhat complicates mechanical feature, but it makes it possible to decrease to 9 m the sinking of construction, than in a series of the cases is reached considerable economic effect.

Sheet 86. Hopper for carbon with panel reinforced-concrete walls and by steel funnel.

The hoppers of rectangular cross section consist of the steel funnels, adjustable by the framework/body of building and arranged/located above sections from reinforced-concrete panels. Overlap above hoppers - from reinforced-concrete ribbed slabs. Slots in overlap are intended for coaling.

The reinforced-concrete panels of the upper part of the hopper are installed to the stiffening rib of steel funnel, which envelopes its outline/contour from inside. In the vertical angles of panel, they are linked between themselves and with columns welding of laying cell/elements and issues of reinforcement. Joint is filled with concrete of brand 300. Upper transverse panels are equipped by steel stands for the support of the plate/slabs of overlap. With the larger volume of the hopper of the wall of jar, they are made from the C-shaped panels, connected by the loop joints (see sheet 26).

The steel funnel of hopper rests on the framework/body of building four by struts from rolling double I. Under I is arrange/located a small steel funnel - subhopper. Through holes in the cap/cover of subhopper, is produced the stirring of the deteriorating carbon. The walls of funnels are intensified by stiffening ribs from rolling angle irons. Angles are formed by rolling angle irons and are rounded off for an improvement in slip conditions. Funnel is manufactured at plant from two transportable cell/elements, connected on assembly by consolidation joint.

Sheet 87. Standardized section of silo housing for different materials with composite reinforced-concrete tanks whose diameter is 12 m, and whose capacitance/capacity is 3000 m³.

The standardized standard sections of silo storages with silos 12 m in diameter are intended for storing different bulk materials in up to 1.6 t/m³ specific weight. The shown on drawing basic structural cell/elements of housing form strictly depository. In concrete/specific/actual project they are supplemented by receptor, above-silo galleries, elevators, staircases, railroad or automobile weights and to that by similar parts, made with the application/use

of the standardized articles.

The bottoms of jars are furnished at height with 10.8 m for passage of train under silo and 6 m for the round of motor vehicles. The height of jars 3000 m^3 in volume - 30 m; 1700 m^3 - 18 m. In connection with specific conditions standard section can consist of one, two and four jars in common/general/total up to 12000 m^3 capacitance/capacity.

Foundations reinforced-concrete monolithic, with the soils of average density - solid to entire section in the form of girder plate/slab with glass type bases under the shown on drawing high under-silo deck. The depth of laying is not less than 3 m; in the presence of railroad weights - it is not less than 5 m. With extra-heavy, virtually incompressible soils can be made separate foundations in the form of plate/slabs, film/strips or bases. With the soft, strongly compressed ground the basis/base is strengthened or are clogged the piles, which transmit load on underlayers.

Columns by section/cut 1x1 m are installed in the beaker/sleeves of bases to adjusted on level of concrete. Monolithization in beaker/sleeve is produced by concrete on small crushed stone of mark/brand not below 200. The under-silo deck of one silo are 12 columns, grouped on 3 and arrange/located on rectangular axial mesh.

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They overlap with the composite reinforced-concrete beams, which form external ring under walls tanks and recessed square under steel half-hopper. Columns are coupled with beams by bond and welding the issues of reinforcement. Joints are assembled in one piece by concrete of brand 300.

The bottom of silo forms monolithic plate/slab 0.4 m in thickness from inclined concrete and steel half-hopper, whose upper hole is lesser than the diameter of silo. Walls tanks are assembled from chute elements of length whose is 1/4 circumference, whose height is 1.2 m and whose thickness is 0.16 m, arrange/located with the bond of vertical it is butting. Vertical joints welded; the side seams are intensified by solution key and welding through 1/12 circumference. On assembly chute cell/elements can be enlarged into tubular furnace sections.

In the places of the coupling of silos into the side seams between cell/elements, are laid the reinforcing cages and tightening bolts. The joints of silos are assembled in one piece by concrete on small gravel. For the formation of key within the limits of joint in

chute cell/elements, are provided for the groove/slots.

The coating of silos is made from composite reinforced-concrete plate/slabs by nominal size 3x3x0.2 m, packed on steel beams. On sections with holes for technological equipment, are packed special or monolithic plate/slabs.

The steel frames, which form the framework/body of above-silo gallery, rest directly on floor beams. Frame walls and the roofing of above-silo gallery are made from corrugated asbestos cement sheets.

The assembly of all composite cell/elements of under-silo deck can be produced by crawler tap/cranes. The walls of silos are installed by tower cranes, which are moved along housing.

Sheet 88. Silo housing for a cement with the separate prestressed monolithic reinforced-concrete tanks whose diameter is 18 m, and whose capacitance/capacity is 7300 m³.

Silo housing for one-time storage 72000t of cement consists of eight separate jars whose diameter is 18 m and whose height is 30 m, arranged in two series. Series are united by railway lines and above-silo galleries into two independent technological lines which

car be elevated alternately.

The individuality cf jars allcw/assumes tte application/use cf wirding machines, which generate the reduction cf walls with high-strength reinforcement. Preliminary reduction reduces wall thickress double.

Sclid base plate with t-beamed type bases is made from monolithic reinforced concrete. Under-silo deck is formed 14 columns between which they pass two railroad tracks. Above them into two tier, are furnished the area/sites with dosage equipment, which rest on the cantilever projections of columns.

Columns overlaps bottom plate/slab - monolithic reinforced-concrete banks 1.5 m in thickness with rubble concrete tapers to chutes.

Walls banks 200 mm in thickness are concreted in the sliding or adjustable to inventory planking and after the winding on of spiral reinforcement are cover/coated with the protective layer of gunite 20 mm in thickness.

The tent overlap above the silo jar is installed from the trapezoidal reinforced-concrete ribbed slabs, packed between carrier

rings.

The frameworks of above-silo galleries are made from steel farm/trusses and the frames, amalgamated into three-dimensional/space assembling blocks; enclosure/protection - from the corrugated asbestos cement sheets of the intensive airfoil/profile. The shaft/mine of staircase, elevator and pneumatic conduit/manifold is arrange/located on the transverse axis of construction. It is made from monolithic reinforced concrete and is raised simultaneously with banks in the sliding planking.

The assembly of all composite cell/elements in the zone of under-silo deck is produced by railroad or crawler tap/cranes. The blocks of above-silo galleries are installed by tower crane. The examined construction is designed in experimental order.

Sheet 89. Silo housing for grain with the separate composite reinforced-concrete banks whose diameter is 12 m, and whose capacitance/capacity is 3000 m^3.

Silo housing 11500 t in capacitance of grain consists of five jars whose diameter is 12 m and whose height is 27 m. Banks are united by the partly buried conveyor gallery, which passes in

under-silo deck, and by the open above-silo passage on top. For the regulating of the discharge of grain of jar, are equipped by discharging ducts.

Basis/base banks forms monolithic reinforced-concrete plate/slab 0.55 m in thickness. To it are installed glass type composite bases. Under-silo deck is assembled of 12 columns, overlapped by composite circular zonal beam. In center is arrange/located monolithic tubular furnace section - basis/base of discharging duct, the overlapped steel by funnel.

Funneled bottom banks is installed of 24 sector ribbed slabs, which rest on circular zonal beam; wall - from the prestressed chute elements of length whose is 1/6 circumference, whose height is 1.5 m and whose thickness is 0.1 m. On assembly chute cell/elements are enlarged in tubular furnace sections and are installed in wall banks by tower crane, equipped with special crosshead.

Depression - discharging duct is assembled from shell sections with holes for the discharge of grain. Bank it overlaps tent with arch/summary from trapeziform ribbed slabs.

The application/use of chute cell/elements with the prestressed electrothermal manner with reinforcement makes it possible to mold

them in the vertical cassette settings up of large productivity, provides convenience in the storing and transport, it guarantees assembling strength and eliminates the expensive works on the winding on of spiral reinforcement and the guniting of the wall of jar.

Housing is installed by full-turn tower crane by the load capacity 10 t, which are moved on rails.

Sheet 90. Silo housing for grain with composite reinforced-concrete bank-cells by section/cut 4x4 m, by capacitance/capacity 435 m³.

Silo housing 15100 t in capacitance of grain consists of 5x9=45 jar-cells by section/cut 4x4 m.

By the basis/base of housing serves solid reinforced-concrete plate/slab 0.6 m in thickness, packed for preparation from concrete of brand 50 0.1 m in thickness. The framework/body of under-silo deck form columns by section/cut 0.65x0.65 m, glass type established/installed in bases, and brace T-beams, which overlap columns in both directions. The well, which is formed on the joint of beams, before monolithization is reinforced by the connected with issues from columns framework/body. The walls of under-silo deck are installed from light-concrete panels or are lined from local

materials.

To trace beams are installed the tanks, which consist of bottom, walls and overlaps. Bottom - funnel it is assembled of four ribbed slabs and rests on the flanges of trace beams. The walls of jars are installed from the uniform thin-walled finned panels of double-T section/cut with a weighing of 1.025 t, formed from concrete of brand 300. In upper tier can be applied the panels from concrete of brand 200 with the lightened reinforcement. For accelerating the assembly and the full/total/complete loading of tap/cranes, wall panels are enlarged into tetrahedral cells.

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The joints between wall panels are welded by means of junction/unit junction plates and are cover/coated with the trimming of jars on top with drain from cement mortar, from below - by anticorrosive coloring. The open sides of external it is butting they are covered with battens. The forming in joints wells are assembled in one piece by concrete of brand 150. Each jar overlaps with two plates with the stiffening rib, turned to joint.

The framework/body of above-silo gallery is assembled from struts and the cross bars, which form the double-transit frames,

arrange/located above the transverse walls of jars; enclosure/protections - from corrugated asbestos cement sheets.

Assembly is produced by tower cranes by load capacity 5 t, that are moved from both sides along housing.

The cost-effectiveness/efficiency of construction is based on the mass application/use of a uniform thin-walled reinforced-concrete panel, manufactured in highly productive cassette settings up.

Sheet 91. Water tower from the precast reinforced concrete with shank 15-30 m in high and by tank 100 m^3 in capacitance.

The foundation of tower (glass type reinforced-concrete shoe) is assembled of four sector cell/elements, packed for crushed stone preparation. Cell/elements are coupled by welding the issues of reinforcement, the monolithization of welds and subsequent filling of beaker/sleeve with concrete of brand 35.

Plate/slab-shells for the assembly of shank are manufactured during vibration-rolled setting up of the system of All-Union Scientific Research Institute of the Hydrolysis and Sulfite Liquor Industry, which consists of reinforced-concrete matrix/dies and

self-propelled truck with hopper for supply, with the leveling panel for packing and the sliding vibration-setting for the packing/seal of concrete. After packing of concrete of article, they are steamed under removable panels.

Plate/slabs up to 5 m in long are molded in the form of 1/4 surfaces of round cylinder 3 m in diameter. Their circular faces are supplied with the steel flanges of C-shaped section/cut, opened vnutr6 and by those weldable with longitudinal reinforcement; linear faces are made with the loop issues of reinforcement.

The consolidation assembly of plate/slab-shells into the component/link of shank is produced in steel jig. The loop joints of linear faces are assembled in one piece by concrete of brand 300. The coupling of component/links on the assembly of tower is produced by bolting together of flanges with the subsequent welding on perimeter.

The selection of the mounting method of shank depends on available crane equipment. It can be completely assembled in horizontal position and establish/installed by the method of the "falling/incident arrow/pointer" or mounted from separate component/links by tower crane by load capacity 25 t.

Lower sunk into soil component/link of shank has issues of

reinforcement, cranked up into the beaker/sleeve of foundation. It forms the stump, adjustable in the period of the zero cycle of the production of works. The upper component/link of shank by means of flanges is bolted together with the composite reinforced-concrete area/site on which is based the tent.

Octagonal area/site under tank and tent is assembled from radial beams and triangular plate/slabs. Tank is welded from steel plates. Under I laid waterproofing.

Tent is assembled from cellular concrete wall panels and triangular reinforced-concrete flooring slabs. Heater and water-insulating carpet are packed on the spot. In the center of roof, is installed exhaust shaft/mine for the ventilation of tent.

For an incidence/impingement into tent within shank, is installed steel staircase with the area/sites within 2.5 m; outside - the suspension reel, collected from cellular concrete plate/slabs. In South regions the tank is installed without tent and is covered with cap/cover.

The experimental project of tower is comprised for purpose of the study of the possibilities of applying the reinforced-concrete plate/slab-shells.

Sheet 92. Standard water tower from monolithic reinforced concrete with shank 15-35 m in high and by tank 200 m^3 in capacitance.

The foundation of tower (circular reinforced-concrete plate/slab with fin/edge on the outline/contour of shank) is packed for preparation from lean concrete above the condensed with crushed stone soil.

Shank (monolithic reinforced-concrete shell) is made in the inventory sliding or adjustable to planking. In the upper part of the shank, on 2.5 m it is lower than the tank, is arrange/located reinforced-concrete area/site with balcony for an entrance to gallery. To area/site is suspend/hung steel staircase. Shank is completed by the circular plate/slab, which is lowered on 1.75 m in circumference.

Cylindrical reinforced-concrete tank with conical coating is installed to the plate/slab, which concludes shank, on waterproofing from two-layered ruberoid carpet and the asphalt leveling layer. The edges of carpet are filled to circular tray/chute in thicker than the cement sex/floor of gallery. Tank is made from hydraulic engineering

concrete; walls and bottom are plastered from within by cement mortar with the iron plating of surface.

The lower part of the tank is encircled by gallery with walls from light-concrete blocks; upper part - air interlayer, by heater and sheathing/skin from corrugated asbestos cement sheets. Gallery is covered with composite reinforced-concrete plate/slabs. The coating of gallery and walls and the roof of tank are warmed by semirigid mineral wool plate/slab 50-90 mm in thickness.

The steel tank, provided for by alternative design, is welded made of rolling heavy-gauge steel, it is installed for waterproofing from 20-millimeter layer of hot bitumen and overlaps with rafter system from angle irons with the packed on it made of planks heated panels. The walls of steel tank to entire height are warmed air interlayer and by mineral wool plate/slabs they are face/trimmed by corrugated asbestos cement sheets. Gallery around tank in this case is replaced by the open balcony.

In winter period the water for production needs is preheated by the vapor, started directly into tank; drinking water - by the closed heating systems or the electric furnaces, adjustable in shank and gallery of tower.

The ventilation of those connected gallery, the air seal on the perimeter of the upper part of the tank and of above-water space in it is realize/accomplished through the exhaust shaft/mine in the center of roof.

The system of lightning protection consists of the lightning control, connected by the current-deflecting cable with grounding.

Water tower of the examined construction widely is applied in the systems of everyday and production water supply.

Sheet 93. Standard ground-based steel reservoir for oil-products 3000 m^3 in capacitance with wall and by bottom made of rolled constructions.

Reservoirs made of sheet rolled steel are made by capacitance/capacity to 10000 m^3. Wall and half-bottoms are welded at plant made of sheet or roll steel and are transported to field by those convolute into overall reel/cylinders. Half-bottoms are wound to central strut with five rings 2.66 m in diameter. Three Intermediate ring removable; upper and lower are utilized in the construction of reservoir. Wall is wound to the mine/shaft staircase whose area/sites are also entered in circumference 2.66 m in

diameter. Roof is assembled of 18 sector panels and the central panel with a diameter of 2.75 m.

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The assembly of the steel constructions of reservoir begins from packing of bottom. Reel/cylinder it rolls being rotated against coiling to the edge of basis/base, it is free/released from the fastening coiling plate/bars and is drawn out by tractor as trailer cylinder, expand/scanning half-bottom to designed position. The joint between half-bottoms is welded overlapping on top, by the continuous seam. In center is installed the freed from rolled half-bottoms strut. On bottom on risk, that traces the position of wall, through every 0.2-0.3 m are welded plate/bar-limiters.

The reel/cylinder of wall is installed on clamping fixtures from bolsters to the lubricated by grease pan/pallet. Then it is connected by cable and is tightened to the edge of bottom so that its edge would render/show in designed position. After this are shorn the fastening coiling plate/bars and slowly is attenuate/weakened the cable, which ensures smooth unwinding. Cable from the tractor, which run up/turns reel/cylinder, is passed through the hinged assembling bracket, attached at height 0.5 m of bottom. Through each the fourth of the revolution of reel/cylinder (3-4 m of scan/development) the

bracket is cut off and is welded again. The expanded/scanned part is adjusted and to limiters, it is straightened and is welded by bilateral weld.

In parallel with the unwinding of reel/cylinder is conducted the assembly of shield roofing. Sector panels are packed to central strut and the upper edge of wall, after seizing the latter by plate/bar-detectors. At the end of the unwinding, is recovered from reel/cylinder and is installed to its foundation its coil - mine/shaft staircase.

Following by the setting up of all panels of roof is welded overlapping by solid bilateral weld the closing vertical field joint of the untwisted wall reel/cylinder. In the upper part of the wall on perimeter, are welded the vertical stiffening ribs, arrange/located in the joints of sector panels. In regions with load due to wind more than 55 kg/m², the housing of reservoir is strengthened by the horizontal ring of rigidity.

After the assembly of primary constructions, is installed the equipment of reservoir, including access 0.5 m in diameter, cut into into wall at a distance is not less than 1.5 m of vertical joint, but on roof - a light hatch, circular enclosure/protection and the operating area/sites.

The application/use of the sheet of rolled constructions of prefabrication considerably decreases the labor consumption of assembly and guarantees the impenetrability of reservoirs via information to the minimum of fractionage of assembling welds.

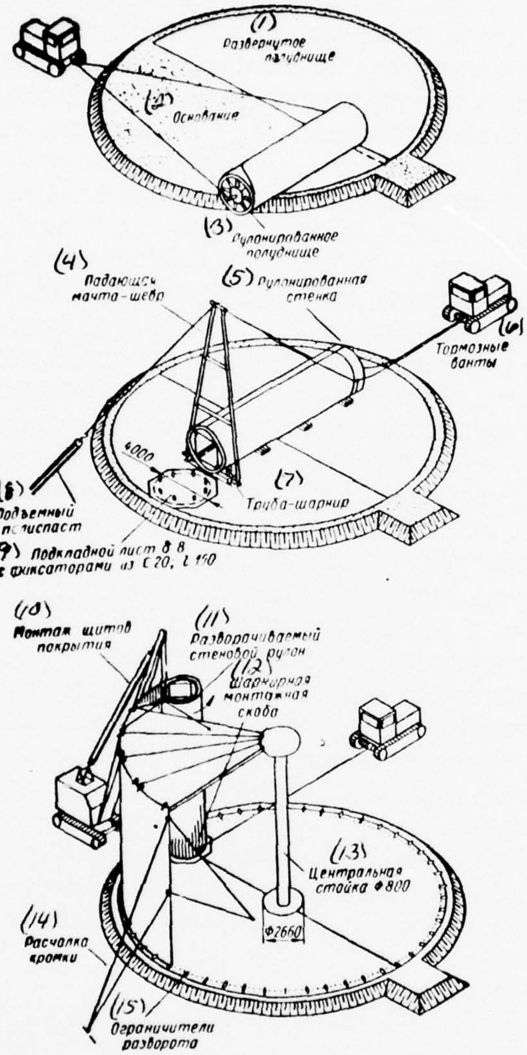
Sheet 94. Sunk reinforced-concrete reservoir for oil-products 30000 m³ in capacitance with panel walls and by coating from plate/slabs.

Reservoir consists of monolithic bottom and composite of wall and coating. All the constructions of reservoir undergo reduction by winding on on the wall of the high-strength stressed wire 5 mm in diameter. Thickness of bottom 120 mm with an increase to 160 mm in center section and to 340 mm in the adjacent the wall outline/contour. The reinforced-concrete plate/slab of bottom is packed to the covered with pergamyn layer of sand, which lowers friction against soil at the moment of reduction. For decreasing contraction stresses, the reinforcement and the concreting of plate/slab are conducted by the separate map/charts, divided by the filled subsequently welds. On the perimeter of bottom, is arrange/located circular reinforced-concrete foundation under the reservoir.

The wall of reservoir is assembled from the panels of prefabrication 10 t in weight with the prestressed vertical reinforcement. For the dense adjoining of winding on, the external surface of panels is cylindrical. During the setting up of panel, they are linked with circular foundation by welding laying cell/elements, and between themselves - welding of the issues of reinforcement. After welding vertical joints in 150 mm by width are assembled in one piece by concrete during nonshrinking cement. From inside the welds are cover/coated with the layer of gunite. Of face side wall panels are equipped by arm for to the support of flooring slabs.

The coating of reservoir is assembled from the radially arranged/located trapeziform flat/plane plate/slabs whose length is 5.9 m and whose thickness is 0.1 m, packed on the tangentially directed beams of top-hat. The center section of the coating is formed by two ribbed slabs of semicircular configuration and by the packed above them monolithic reinforced-concrete plate/slab with hatch in middle. Beams rest on concentric series of the T-shaped columns, establish/installed on bottom in glass type bases. The welds between plate/slabs are assembled in one piece by concrete of brand 300. On perimeter the coating encompasses the monolithic

reinforced-concrete edge, which ensures the jam of plate/slabs and seal in joint with wall and limiting water screen - layer of water 0.1 m in depth.



Assembly of steel reservoir made of rolled constructions.

Key: (1). Expanded/scanned half-bottom. (2). Basis/base. (3). Rolled half-bottom. (4). Falling/incident mast-shaving tools. (5). Rolled

wall. (6). Braking guys. (7). Duct-hinge joint. (8). Lift block and tackle. (9). Underneath sheet into 8 with clamping fixtures from [20, 1 150]. (10). Assembly of panels of coating. (11). Run up/turned wall reel/cylinder. (12). Hinged assembling bracket. (13). Central strut F8CC. (14). Brace of edge. (15). Limiters making havoc/turn of.

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Water screen provides the impermeability to gas of coating. It moisters concrete and raises its seal, forming 'capillary lock" - the high capillary pressure, developed with the surface tension of the contacting with gas water in the meniscuses, which are formed in the small capillaries of concrete.

Generatrices with the reduction of the reservoir of force of friction between cell/elements are decreased by lubrication from the clay, mixed with bitumen. Lubrication will be applied on bottom under bases, also, above beams under plate/slabs.

The winding on of high-strength helix is produced by winding machine. Tension occurs because of a difference in the speed of winding/coil and the delivery of wire. It can be led to 10000 kg/cm².

Winding on begins from the ring, which stretches coating (300 turns in 3 series). Then is wound ring at the level of bottom (540 turns into 6 series) and a helix on wall (step/pitch from 67 mm in upper to 10 mm in lower part). The appearing as a result of reduction preliminary stress provides the high cracking resistance of all reinforced-concrete constructions of reservoir.

Incidence/impingement on bottom - on the steel u-bolt through the hatch manhole in flooring slab. The lightning protection of reservoir is provided by six lightning rods from steel tubes 10 m in high, connected by the grounding outline/contour.

As the sunk depositories are applied the reservoirs of rectangular configuration with monolithic bottom and walls and composite internal framework/body and coating from the standardized for industrial buildings reinforced-concrete columns, beams and ribbed slabs.

Sheet 95. Sunk open reinforced-concrete reservoir-sump 4500 m^3 in capacitance with panel walls.

The open circular reservoir 40 m in diameter is applied as the sump in which the water, entering from sewer system and passed preliminarily through rough grates and sand traps, is driven off from suspended particles.

In 1.5 - hour the period of the sediment of particle of heavy water they settle in the form of silt on the bottom of reservoir and are guided by silt scrub for arranged/located under central support conical head by the suspended/hung toward the bridge of silt scrub panel into the hopper, arrange/located near wall.

The clarified water falls into tray/chute from under ssemi-immersed circular wall and is abstract/removed through the overflow pocket for further purification/cleaning.

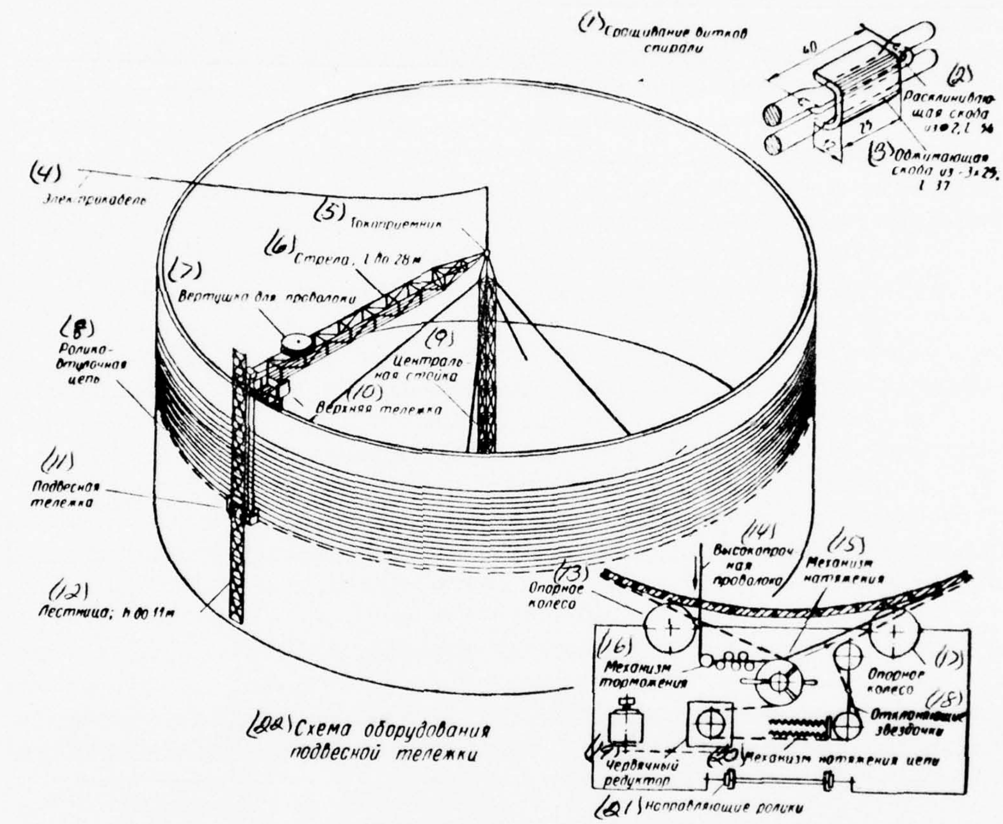
Tankage 4500 m^3, throughput capacity 3000 m^3 in hour. Reservoir consists of monolithic bottom and panel wall with the arranged/located in its upper part tray/chute of trapezoidal cross-section. Wall panel has cylindrical, turned in outside, and plane, turned inside reservoir, the surface, which ensure full/total/complete contact from wound on the outside with spiral reinforcement and the face, fastened from within panel, tray/chute.

Wall panels are inserted into groove/slot on the outline/contour

of bottom. Preliminarily the bottom of groove/slot is aligned by cement-sand solution/opening and is covered with the layer of bitumen. After the setting up of panels, the groove/slot bay with bitumen upward.

Wall panels are connected by welding the issues of reinforcement.

The vertical welds 160 mm in wide are filled with concrete on small gravel. Before monolithization in welds, are installed the bent back reinforcing rods, passed then between the panels of tray/chute.



The general view of setting up and the schematic of the device of the suspension truck of the wiring machine of model АНМ-5.

Key: (1). Union of the turns of helix. (2). Wedging suture from. (3). Reducing bracket from. (4). Electric cable. (5). Current-collecting device. (6). Arrow/pointer, 1 to 28 m. (7). Revolving door for wire. (8). Bush-roller chain. (9). Central strut. (10). Upper truck. (11). Suspension truck. (12). Staircase; h to 11 m. (13). Supporting wheel.

(14). High-strength wire. (15). Mechanism of tension. (16). Mechanism of braking. (17). Supporting wheel. (18). Deflecting chain wheels. (19). Worm reducer. (20). Mechanism of chain tension. (21). Guide pulleys. (22). Circuit of equipment of suspension truck.

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Fastening wall panels in the process of assembly is produced by inventory braces.

The finned panels of tray/chute are installed to the steel assembling stands, welded to the laying cell/elements of wall panels, and they are held in the process of assembly by inventory tie pieces. Their monolithization it is butting it is produced after the winding on of spiral reinforcement. The internal surface of walls is cover/coated with the gunite of composition 1:3 into two layer, with overall thickness 20 mm.

The winding on of the stressed high-strength steel wire is produced by winding machine. Spiral reinforcement is covered with the layer of gunite. In order to avoid the appearance of cracks in protective layer, sump is preliminarily filled with water. All

composite cell/elements are installed by crane truck by the load capacity 5 t, which are moved on the edge of foundation area or the bottom of sump.

Sheet 96. Underground completely assembled reinforced-concrete reservoir 500 m³ in capacitance.

Completely assembled reservoirs 100, 500 and 1000 m³ in capacitance are assembled from cylindrical plate/slab-shells and flat/plane end-type plate/slabs up to 5 t in weight.

Plate/slab-shells are molded during vibration rolling setting up of system VNIIGS for a reservoir 500 m³ in capacitance in the form of 1/5 surfaces of round cylinder with diameter and forming 5 m. Their circular faces are equipped by straight lines, and linear - by the loop issues of reinforcing mesh, weldable in field joints. End-type plate/slabs are concreted in common forms. After the formation of article, they are covered with panels and are steamed, and then on motor vehicles by load capacity 5 t they are brought to field. Reservoirs are installed by consecutive rings.

The assembly of each ring is produced around the steel jig, adjustable to lower plate/slab-shell. Conductor consists of two those

connected by the struts of the frames, equipped with the moved on jacks detents. Detents for upper plate/slats - channel bars No 20 - they serve simultaneously as planking for the concreting of longitudinal it is butting. After the monolithization of ring, the jacks break away channel bars, and jig is moved along the longitudinal axis of reservoir. At the end of the assembly, the jig is dismantled to its comprising corner rods and is supplied through the access to surface.

For manufacturing of all cell/elements and monolithization, is butting it is applied the concrete of brand 300. The assembly of reservoir is produced by means of crane truck by load capacity 5 t.

Changing diameter and the number of rings, it is possible to design analogous reservoirs from 100 to 1000 m³ in capacitance.

During the application/use of a series of matrix/dies during vibration rolled setting up, it is possible to organize under conditions of range/polygon the flow manufacture of cell/elements with the high quality of concreting. The complete assembly of construction shortens the periods of the erection of reservoir, and its form allow/assumes any sinking without additional fastening devices.

Sheet 97. Spherical gasholder 550 m^3 in capacitance, pressure to 16.4 ATI.

Spherical gasholder is utilized for storing liquified hydrocarbon gases (technical propane). Internal pressure propane at the calculated temperature in 50°C is equal to 16.4 ATI.

For an economical layout the parameters of sphere must be selected in such a way that its great circle would be multiple to the quadruple width of standard sheet. In this case the volume of sphere is equal to 550 m^3, diameter - 10.2 m and great circle - 32 m. In it is packed 16 shells 2 m in wide (from sheet steel) or 32 shells with a width of 1 m (made of cheaper universal plate).

Spherical shell is welded on the spot of six equal quadrants. Its layout is analogous to the layout of the casing of football ball. Quadrants are welded on the bench of consolidation assembly of four or eight shells.

At design pressure in 16.4 ATI the required thickness of shell 32 mm. For the purpose of the reduction of prices of blank (replacement of stamping rolling) spherical shells are made two-layered from sheets 16 mm in thickness, weldable by electroslag

welding. The methods of welding multilayer shells are developed in the institute of the electric welding im. E. O. Paton of the Academy of Sciences of UkrSSR.

Spherical container is freely packed to the carrier ring, rolled over its surface. For the release of thermal stresses, the carrier ring by means of cylinders has the capability of the radial displacement of relatively reinforced-concrete foundation. Foundation ring is assembled from the reinforced-concrete blocks of t-beamed section/cut, assembled in one piece during setting up.

Gasholder is equipped by two hatch manholes, arrange/located on the poles of sphere. In the place of the fitting of hatch, the shell is intensified by the circumferential butts. To the area/site, arrange/located around the roof hatch, conducts steel staircase. Branch they cut into into sphere or the place of the approach of gas pipes. Within gasholder, on the rotating in the center of sphere support, are establish/installed they oscillated with ballast and with that gauging lift by cable, making it possible to produce the examination/inspection of any section of spherical surface.

The assembly of gasholder begins from the consolidation assembly of quadrants. In this case, spherical shells are installed on special bench, since electroslag welding is produced only in approximately

vertical direction. Welding quadrants begins from four vertical welds. Then sphere is turned on 90° two times around mutually perpendicular horizontal axle/axes, and are welded the others of eight welds, led by rotations to vertical direction. By last/latter rotation gasholder is set in operating position. Rotations are realize/accomplished with the aid of cable, winch and the established/installed on the jacks directing frame with rollers.

Sheet 98. Dry gasholder with rubber section 5000 m³ in capacitance.

Dry gasholder is intended for storing purified and dehydrated ethylene. It represents by itself common type steel reservoir, equipped with piston. Between the machine tools of reservoir and piston, is furnished flexible section from rubberized fabric, hermetically fixed with its edges to their perimeters.

Under the pressure that enter from below gas, the piston is built up upward and reverses the stocking of flexible section, which limits capacitance/capacity in the upper part of the cylindrical surface. The necessary pressure is provided by the dead weight of piston and by additional surcharge weight. In the end upper position of piston, automatically is switched on the system of gas discharge.

Piston consists of the bottom and the cylindrical wall, formed by framework/body from double T and by steel shell. On the upper perimeter of wall, passes circular area/site, on bottom - directing for packing the concrete loads. The steel shell of cylindrical wall protects flexible section from damages and directs it with the reversing between the piston and the reservoir. It is made made of sheet steel 3 mm in thickness and is fastened to framework/body to shackle bolts. To framework/body is fastened from below the gas-impermeable bottom plating made of sheet steel 5 mm in thickness, welded along short side butt, and on long - overlapping.

For a preservation from slants, the piston is suspend/hung to the leveling device from the conjugate rollers, which are moved on the intersected cords with soft center.

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In lower position the piston lies down on the special block/backings, establish/installed on bottom, or can be elevated to height by 800 mm for inspection and repair on mounting bases from ducts. On the elapse of necessity, the mounting bases are packed on piston head in the form of additional surcharge weight.

Between the circular area/site and the piston head, are

arrange/located two u-bolts. In the center of bottom, is placed the hatch manhole 600 mm in diameter with the cap/cover, which is battened down on bolts. Flexible section is cemented on the spot from rubberized fabric 5-6 mm in thickness. Pressurized/sealed joint with steel shells is provided by the pasted flange joint.

The wall of reservoir is manufactured with the method of rolling from sheets 5 mm in thickness. For forming the smooth internal surface, which does not prevent the slip of rubberized fabric, the sheets of width are welded butt and both directions, but closing assembling weld is made butt on the block/backing, establish/installed outside. The rigidity of wall is provided by the external circular fin/edges from channel bars, arrange/located through 3-4 m on height, and by the internal vertical fin/edges from angle irons, placed above the highest position of rubber section.

The flat/plane bottom of reservoir is manufactured with the method of rolling from two widths, welded from sheets 6 mm in thickness, along short side butt on block/backing, and on long - overlapping. During assembly the bottom is packed on ground pillow.

The framework/body of spherical roof is installed from the amalgamated panels, which form the system of radial rafters with rigid circular spacers. Four Sectors of rafters and one circular

belt/zones of spacers are fastened by diagonal stays.

Rafters are fastened with vertical stiffening ribs. Border of roofing from sheets 6 mm in thickness is welded to rafters and the bordering ground angle iron. The middle part of the roofing, welded overlapping from sheets 3 mm in thickness, lie/rests freely on the framework/body of roof.

For the natural ventilation of space above the piston in the center of roofing, is arranged the hatch, shielded by cap/hood from residue/settlings. Incidence/impingement into space above piston - through the hatches within the wall of reservoir, placed at the level 1/3 and 2/3 of its height. The visual inspection of reservoir is produced from the circular area/sites, which pass at the level of 2/3 heights and on the edge of roof. Area/sites and hatches are earth-referenced by steel staircase.

During the assembly of gasholder, special attention is given the high degree of seal, which ensures dehydration and the preservation/retention/maintaining of the purity/finish of gas.

Sheet 99. Wet single-section gasholder 1000 m³ in capacitance with steel ground-based reservoir and by vertical guides.

Gasholder is intended for storage and distribution of humid gases. In localities with cold climate, steel ground-based reservoir is warmed by brick wall.

To gasholder are fed the industrial gas, water also of pairs, that warms water in winter time. All conduit/manifolds they pass through the adjacent the wall of reservoir camera/chamber of input/introduction and the internal collector/receptacle, which envelopes under bottom.

Foundations consist of the tape/strip composite reinforced-concrete ring, which passes on the perimeter of reservoir and concentrically arranged/located columns, connected by foundation beams under the warming up wall.

Besides vertical effort/forces, tape/strip ring absorbs radial pressure soil. Ring is completed by the reinforced belt/zone from concrete of brand 150, which limits multilayer basis/base under the bottom of reservoir. The surface of basis/base is conical with lift in center to 1/75 diameter.

Wall and the bottom of reservoir and shell of wall and cap/cover

of bell jar are manufactured with the method of rolling or with the method of the amalgamated panels. For sheets 5 mm in thickness vertical joints are made butt, and horizontal - overlapping. Sheets 3-4 mm in thickness (roofing of bell jar) are connected in all directions overlapping. The field joints of separate reel/cylinders are made overlapping with allowance in 100-150 mm. Maximum/overall diameter of reel/cylinder 3200 mm, maximum weight 40 t. The widths of bottom are cut out taking into account conicity. The load-bearing frame of bell jar consists of tubular struts and the connected with them system of radial rafters. Between rafters are arrange/located spacers and communication/connections. Bordering of the shell of roofing is welded to rafters, remaining part freely rests on them.

Directing bell jars are welded to the wall of reservoir. External guides are connected above it into unalterable/invariable system. In the gasholders of the larger capacitance/capacity of the system of external guides, they are made from latticed cell/elements. Bell jar rests on external guides upper, and for internal guides - by lower rollers.

On the upper perimeter of reservoir, it passes the balcony, which is simultaneously horizontal circular beam for an entire system of steel constructions. It is connected with ground level by steel staircase. The roof of the built up bell jar is connected with

balcony by steel u-bolt.

For inspection and repair into the walls of reservoir and bell jar, cut into two combining hatch 500 mm in diameter with the being battened down cap/covers. In the roof of bell jar, are cut into light hatch - in the center also two cap/hoods with hatches - above gas inlets. Water level in reservoir limits the connected with canalization/sewerage overflow pocket.

Sheet 100. Wet two-unit gasholder 15000 m³ in capacitance with the reinforced-concrete sunk reservoir and by spiral guides.

The constructions of gasholder are developed on the basis of the modernization of the preceding/previous design concept.

Reinforced-concrete reservoir will be sunk into soil in full or in part depending on the level of ground water. It consists of stressed reinforced wall panels and monolithic bottom. Entire reservoir is squeezed by the high-strength cold-drawn wire, wound around wall with additional layers at the level of bottom. On the perimeter of bottom, it passes the thickened reinforced ring, on exchanges are establish/installed the support/sockets for the support of bell jar. The composite wall of reservoir is completed by the

reinforced-concrete monolithic end to which are fastened the steel cell/elements of circular area/site. The protruding above the earth sprinkling part of the wall is warmed by slag or by other effective heaters and is plastered on steel mesh.

The steel constructions of bell jar and telescope are analogous described earlier. Their rolled shells are run up/turned directly in reservoir.

Spiral guides can be made from the intensified by sheet narrow-gauge rail of welded double T or specially rolled airfoil/profile. They are bended out over the helix, which goes over the cylinder of bell jar or telescope at angle of 45° to the horizon, and they are fastened to shell.

Spiral guides are passed through the cast iron rollers, in pairs attached on the steel base plates, establish/installed from the top of reservoir and telescope. The base plates of conjugate rollers are fastened on bolts with the subsequent erection welding. For the straightening of the assembly of hole in base plates, are oval in tangential direction. The permissible displacement/movements of rollers contribute to the elimination of jamming/seizings with the insignificant deformation of spiral guide.

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Application/appendices.

Table 1. Flow numbers of materials for the coatings of industrial buildings.

1 № листов чертежей	2 Характеристика конструкции	3 Расчетная нагрузка в $т/м^2$	4 Серия типового элемента или автор и год выпуска проекта	5 Марка бетона	6 Объем бетона в $м^3$	7 Содержание арматуры в $кг/м^3$	8 Приведенная толщина бетона в мм / 9 Сталь в натуральном весе в кг на 1 $м^2$ проекции покрытия — 10 пролет в м: 12	18	24	30	36	45
				11 указанного типового элемента			12	18	24	30	36	45
	12 Плоские покрытия из линейных элементов (шаг колонн 12 м)											
3	По железобетонным балкам: 13	0,6										
	14 плита 1,5×6 м		ПК-01-111	200	0,55	87	61/5,3	61/5,3	—	—	—	—
	15 стропильная балка 12 м . . .		ПП-01-01	400	1,81	148	25/3,7	40/6,1	—	—	—	—
	16 подстропильная балка		ПП-01-03,62	400	4,2	133	29/3,9	24/5,6	—	—	—	—
							115/12,9	125/17,0				
5	По железобетонным фермам: 17	0,6										
	14 плита 3×6 м		ПК-01-74,62	300	0,93	118	—	52/6,1	52/6,1	—	—	—
	15 стропильная ферма 18 м . . .		ПП-01-02,62	400	3,02	250	—	28/7,0	36/9,7	—	—	—
	16 подстропильная ферма		ПП-01-04/63	400	3,65	190	—	17/3,2	13/3,0	—	—	—
								97/16,3	101/18,8			
6	18 Из тавровых пустотных железобетонных плит	0,6	19 Промстройпроект (М), 1961	—	—	—	—	110/10,7	130/13	—	—	—

20 Скатные покрытия из линейных элементов (шаг колонн 12 *м*)

4	По железобетонным фермам: 17	0,4										
	14 плита 3×6 *м*		ПК-01-74/62	500	0,93	100	—	52/5,2	52/5,2	52/5,2	—	—
	15 стропильная ферма 18 *м* . . .		ПК-01-129	400	2,43	185	—	23/[illegible]	31/6,4	37/8,8	—	—
	16 подстропильная ферма		ПК-01-110	400	4,5	178	—	21/3,7	16/2,8	13/2,7	—	—
								96/14,8	99/14,4	102/16,7		
	То же, при шаге ферм 12 *м*: 21	0,4										
	14 плита 3×12 *м*		ПК-01-99/62	400	2,75	115	—	77/8,8	77/8,8	77/8,8	—	—
	15 стропильная ферма 18 *м* . . .		ПК-01-129	400	3,75	280	—	17/4,9	26/6,4	29/6,3	—	—
								94/13,7	103/15,2	106/15,1		
22	По железобетонным безраскосным фермам: 22	0,2	24									
	23 армоцементная плита 3×12 *м*		Теплоэлектропроект (М; Л), 1961—1963	400	1,80	118	—	—	50/5,9	50/5,9	50/5,9	—
	15 стропильная ферма 24 *м* . . .			500	4,58	300	—	—	16/4,8	16/5,7	22/6,3	—
									66/10,7	66/11,6	72/12,2	
28	25 Из тавровых железобетонных плит	0,6	26 Гидропроект (М; Л), 1961—1964	—	—	—	—	—	167/25,6	175/33,5	—	—

Key: 1 - No. sheets of drawings. 2 - characteristic of construction. 3 - design load in t/m². 4 - series of standard cell/element or author and year of the issue of project. 5 - mark/brand of concrete. 6 - volume of concrete in m³. 7 - content of fittings in kg/m³. 8 - given thickness of concrete in mm. 9 - steel in natural weight in kg on of 1 m² of the projection of coatings. 10 - flight/span m. 11 - standard cell/element indicated. 12 - flat/plane coatings from linear cell/elements (step/pitch of columns 12 m). 13 - on reinforced-concrete beams. 14 - plate/slab. 15 - rafter beam. 16 - frame-supporting beam. 17 - on reinforced-concrete girders. 18 - from t-beamed vacuum reinforced-concrete plate/slabs. 19 - State Planning Institute for General-Construction and Sanitary-Engineering Planning of Industrial Establishments (Promstroyproyekt) (M), of 1961. 20 - sloping coatings from linear cell/elements (step/pitch of columns 12 m). 21 - the same, with the step/pitch of farm/trusses 12 m. 22 - on reinforced-concrete Vierendeel trusses. 23 - reinforced-cement plate/slab is of 3 X 12 m. 24 - All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures (Teploelectroproyekt) (M; L), 1961-1963. 25 - from t-beamed reinforced-concrete plate/slabs. 26 - hydroelectric power project (M; L), 1961-1964.

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7	Из сборных железобетонных коробчатых плит	0,4	Оргтехстрой (Л), 1963	—	—	—	—	—	100/10	—	—	—
49	По стальным фермам:	0,4										
	плита 3×6 *м*		ПК-01-74/62	300	0,93	100	—	—	52/5,2	52/5,2	52/5,2	—
	стропильная ферма		ПК-01-125	—	—	—	—	—	—/14,9	—/19,2	—/24,7	—
	подстропильная ферма		ПК-01-125	—	—	—	—	—	—/5,0	—/3,8	—/3,9	—
									52/25,1	52/28,2	52/33,8	
	То же, при шаге ферм 12 *м*:	0,4										
	плита 3×12 *м*		ПК-01-99/62	400	2,75	115	—	—	77/8,8	77/8,8	77/8,8	—
	стропильная ферма		ПК-01-125	—	—	—	—	—	—/14,4	—/20,1	—/23,2	—
	плита 1,5×12 *м*		ПК-01-99/62	400	1,96	132	—	—	—	—	—	108/14
	облегченная стропильная ферма	—	Теплоэлектропроект (Л), 1961	—	—	—	—	—	—	—	—	—/31
									77/23,2	77/28,9	77/32,0	108/45
	Скатные покрытия из волнистых асбестоцементных листов (шаг колонн 6 *м*)											
51; 53	По стальным фермам и прогонам:	0,2	ПК-01-130									
	без кранов		—	—	—	—	—	—/24,8	—/26,0	—/28,4	—/30,6	—
	с опорными кранами		—	—	—	—	—	—/30,4	—/29,4	—/31,4	—/33,3	—
	с подвесными кранами . . .		—	—	—	—	—	—/36,5	—/41,8	—/46,8	—	—
	Покрытия из пространственных конструкций (шаг колонн 12 *м*)											
9	*Цилиндрические оболочки* из железобетонных плит 3×12 *м* . . .	0,45	Промстройпроект (Л), 1963	—	—	—	—	93/13,3	90/13,5	—	—	—
	Покрытия из пространственных конструкций (шаг колонн равен пролету)											
11	Сферические оболочки из железобетонных плит 3×12 *м*	0,45	Промстройпроект (Л), 1965	—	—	—	—	—	84/8,8	—	99/11,7	—
12	*Сферические оболочки* из железобетонных плит 3×3 *м*	0,45	Проектный институт № 1 (Л), 1963	—	—	—	—	—	70/9,4	—	83/13,7	—
	Дополнительные элементы покрытий (шаг ферм 6 *м*)											
63	Светоаэрационные фонари при высоте остекления 2×1,25 *м*:	0,4	ПК-01-126									
	фонарная ферма 6 *м*		—	—	—	—	—	—/4,4	—/3,5	—	—	—
	фонарная ферма 12 *м*		—	—	—	—	—	—/5,9	—/4,7	—/4,0	—	—
5	Стальной каркас подвесного потолка	0,2	—	—	—	—	—	—/4,8	—	—	—	—

Примечание. Принятые в таблице сокращения (М), (Л), (К), (Х) — соответственно Москва, Ленинград, Киев, Харьков повторяются и в других таблицах.

Key: 1 - from composite reinforced-concrete compartmented slabs. 2 - Orgtekhstroy (L). 3 - on steel farm/trusses. 4 - plate/slab. 5 - truss. 6 - frame-supporting farm/truss. 7 - the same, with the step/pitch of farm/trusses. 8 - lightened truss. 9 - Electroheat-plan (I). 10 - sloping coatings from corrugated asbestos cement sheets (step/pitch of columns 6 m). 11 - on steel farm/trusses and drive/girders. 12 - without tap/cranes. 13 - with supporting/reference tap/cranes. 14 - with suspension tap/cranes. 15 - coatings made of three-dimensional/space constructions (step/pitch of columns 12 m). 16 - cylindrical shells of reinforced-concrete plate/slabs. 17 - Promstroyproyekt (L). 18 - coatings made of the three-dimensional/space constructions (step/pitch of columns is equal to flight/span). 19 - spherical shells of reinforced-concrete plate/slabs. 20 - design institute No. 1 (I), 1963. 21 - additional cell/elements of coatings (step/pitch of farm/trusses 6 m). 22 - light-aeration lamp/canopies at the height of glazing. 23 - lantern farm/truss. 24 - steel framework/body of suspension ceiling. 25 - note. in table the contractions (M) accepted, (I), (K), (Kh) - respectively Moscow, Leningrad, Kiev, Kharkov are repeated in other tables.

Page 52. Table 2. Flow numbers of materials for the reinforced-concrete constructions of the middle stories 4.8 m in high.

1 № листов чертежей	2 Характеристика конструкций	3 Расчетная нагрузка в т/м²	4 Серия или автор и год выпуска проекта	5 Шаг колонн в м	6 Приведенная толщина бетона в мм / 7 Сталь в натуральном весе в кг на 1 м² развернутой площади; 8 пролет в м: 6	9	12	18
15	Колонны, ригели и плиты перекрытий унифицированного многоэтажного здания . . . (9)	2,5	ИИ-20	6	205/41	—	—	—
		1,5		6	—	190/31	—	—
17	Колонны, фермы и плиты перекрытий здания с межферменными этажами . . . . (10)	0,5	(11) ЦНИИпромзданий, 1963	6	—	—	175/25	190/28,2
18	Колонны и монолитная плита здания, возводимого с подъемом этажей . . . . (12)	1,5	(13) ЗНИИЭП (Л), 1965	9	—	265/67	—	—
26	Колонны, ригели и плиты перекрытий бункерно-деаэраторной этажерки . . . . (14)	3,3	(15) Теплоэлектропроект, 1963	12	—	—	310/72	—

Key: 1 - No. sheets of drawings. 2 - characteristic of constructions. 3 - design load in t/m². 4 - series or author and year of the issue of project. 5 - step/pitch of columns m. 6 - given thickness of concrete in mm. 7 - steel in natural weight in kg to of 1 m² of the expanded/scanned area. 8 - flight/span m. 9 - columns, cross bars and plate/slabs of the overlaps of the standardized multistory building. 10 - columns, farm/truss and plate/slab of the overlaps of building with intertruss decks. 11 - Central Scientific Research, Planning and Experimental Institute of Industrial Buildings and Structures (TsNIIpromzdaniy). 12 - columns and monolithic plate/slab of the building, raised with the lift of decks. 13 - ZNIIEP (L). 14 - columns, cross bars and plate/slabs of the overlaps of bunker-deaerating bookstand. 15 - Electroheat-plan.

Table 3. Flow numbers of materials to industrial constructions.

№ листов чертежей	Наименование сооружения	Серия или автор и год выпуска проекта	Расход материалов: бетон в $м^3$	Расход материалов: сталь в $кг$	Расход материалов: другие материалы
	Конвейерные галереи (показатели на 1 $м$ длины пролетного строения, проходящего на высоте 14 $м$, включая опоры и фундамент)				
70	Галерея на стальных фермах:	Промстройпроект (Л), 1964			
	пролет 24 $м$, ширина 3 $м$		1,53	500	—
	пролет 24 $м$, ширина 6 $м$		2,45	870	—
71	Галерея коробчатого сечения из П-образных железобетонных элементов:	Оргтехстрой (Л), 1963			
	пролет 24 $м$, ширина 4 $м$		1,25	130	—
	пролет 12 $м$, ширина 4 $м$		1,55	170	—
72	Галерея на сборных железобетонных шпренгельных плитах:	Промстройпроект (Х), 1963			
	пролет 12,2 $м$, ширина 1,5 $м$ . . .		0,79	90	—
	Тоннели и каналы (показатели на 1 $м$ длины сооружения)				
69	Тоннели в одну нитку внутренним сечением:	ИС-01-05			
	2,4×2,4 $м$		2,48	297	—
	4,2×3 $м$		3,78	410	—
	в две нитки внутренним сечением:				
	7,2×2,4 $м$		4,8	750	—
	9,6×3 $м$		6,7	901	—
73	Закрытые подземные каналы в одну нитку внутренним сечением:	Теплоэлектропроект (Л), 1961			
	2,5×2,5 $м$		2,20	275	—
	4,2×3 $м$		3,54	750	—
	в две нитки внутренним сечением:				
	2 (2,5×3 $м$) . . .		4,73	563	—
	2 (4×3 $м$)		6,23	1016	—
	Железобетонные опоры стальных трубопроводов (показатели на 100 $м$ трассы)				
74	Т-образные колонны высотой 6,6 $м$ под нагрузку в 5 $т$ . . .	ИС-01-03	29,2	3760	—
	Двухветвевые колонны высотой 6,6 $м$ под нагрузку 20 $т$ . . .		44,7	4620	—

Градирни (показатели на 1 $м^3$ воды, охлажденной за 1 $ч$ на 10°C)

№ листов чертежей	Наименование сооружения	Серия или автор и год выпуска проекта	бетон в $м^3$	сталь в $кг$	Асбестоцементные листы в $м^2$	Пиленый лес в $м^3$
75	Градирня с башней из сборного железобетона:	Теплоэлектропроект (Л), 1961				
	площадь орошения 4000 $м^2$; производительность 2600 $м^3/ч$; съем с 1 $м^2$ — 6,5 $м^3/ч$		0,23	38	13,7	—
77	Градирня с башней из монолитного железобетона:	То же, 1959				
	площадь орошения 2800 $м^2$; производительность 1900 $м^3/ч$; съем с 1 $м^2$ — 6,8 $м^3/ч$		0,35	32	10	0,003
79	Градирня с башней из стального каркаса, огражденной асбестоцементными листами:	То же, 1960				
	площадь орошения 1600 $м^2$; производительность 1000 $м^3/ч$; съем с 1 $м^2$ — 6,2 $м^3/ч$		0,13	42	18	0,009
80	Секция вентиляторной градирни:	То же, 1960				
	площадь орошения 400 $м^2$; производительность 3600 $м^3/ч$; съем с 1 $м^2$ — 9 $м^3/ч$		0,12	14	0,14	0,05

Page 53. Continuation Table 3.

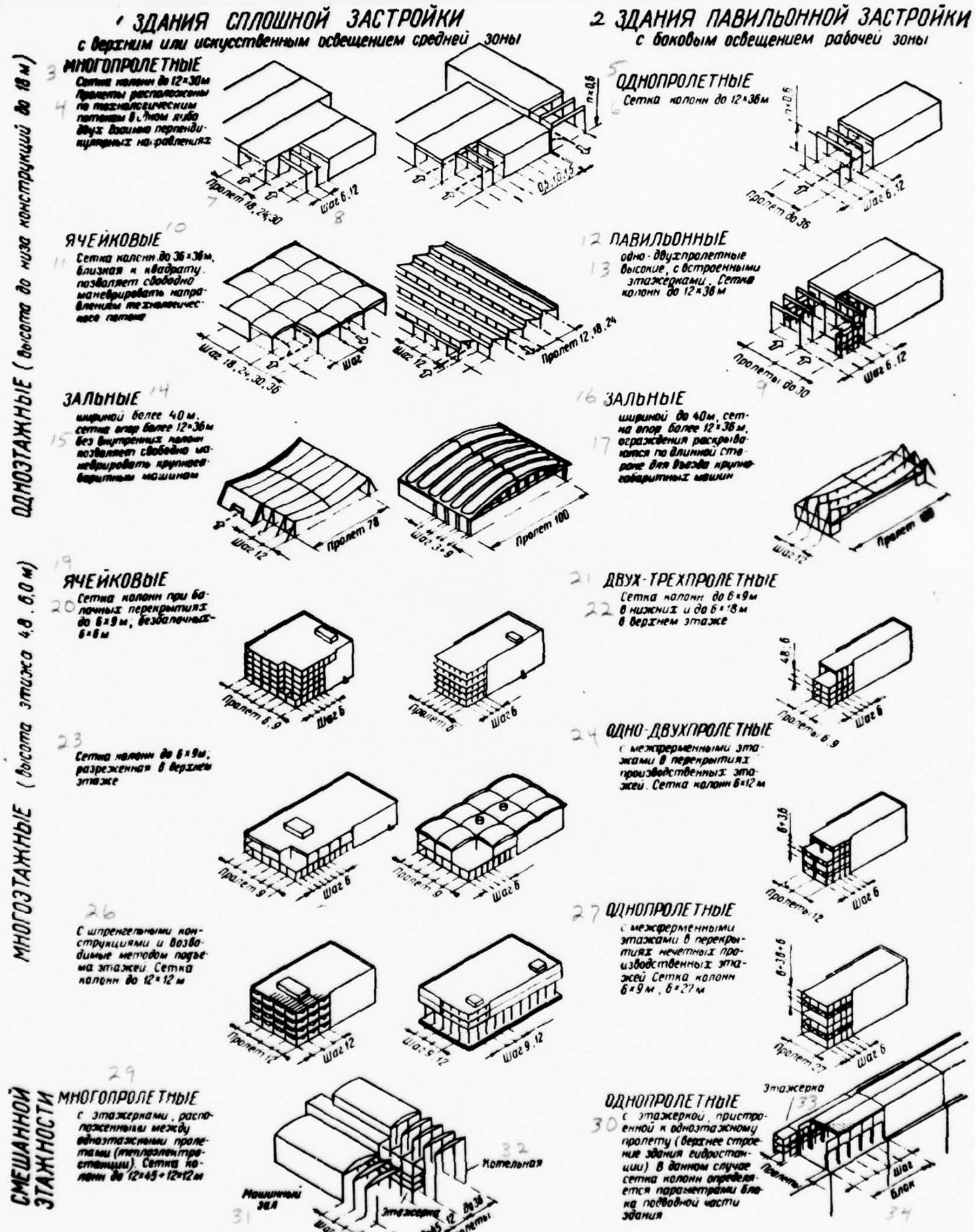
№ листов чертежей	Наименование сооружения	Серия или автор и год выпуска проекта	Расход материалов: бетон в $м^3$	сталь в кг	другие материалы
	Заводские трубы (показатели на 1 $м^2$ поверхности ствола)				
81	Стальная вентиляционная труба; высота 40 м, верхний внутренний диаметр 2 м	Теплоэлектропроект (Л), 1961	—	125	—
82	Стальная вентиляционная труба в несущей башне; высота 120 м; верхний внутренний диаметр 6,5 м	Проектстальконструкция (Л), 1964	—	175	—
83	Монолитная железобетонная дымовая труба; высота 120 м, верхний внутренний диаметр 5,4 м . . .	Теплопроект (Л), 1960	0,268	25	Футеровка в $м^3$ 0,13
	Бункера и силосы (показатели на 1 т емкости)				
85	Разгрузочное устройство из четырех бункеров общей емкостью 250 т угля с боковым вагоноопрокидывателем:	Теплоэлектропроект (Х), 1960			
	строительная часть		8,3	1150	—
	механическая часть		—	1900	—
			8,3	3050	
86	Бункер емкостью 180 т угля (без учета каркаса здания)	Промэнергопроект (Л), 1960	0,1	67	—
87	Универсальный силосный корпус с банками из сборного железобетона диаметром 12 м, емкостью 3000 $м^3$ — 4000 т цемента	Промстройпроект (Л), 1964	0,2	27	—
89	Силосный корпус для зерна с банками из сборного железобетона диаметром 12 м, емкостью 3000 $м^3$ — 2300 т зерна	Зернопроект (М), 1962	0,13	7	—
	Резервуары (показатели на 1 $м^3$ емкости)				
92	Водонапорная башня с баком емкостью 200 $м^3$ и стволом высотой 25 м из монолитного железобетона	Водоканалпроек (Х), 1962	0,9	104	—
	То же, с баком емкостью 400 $м^3$ и стволом высотой 30 м . .	То же	0,65	68	—
93	Наземный стальной резервуар для нефтепродуктов:	Гипроспецпромстрой (М), 1960			
	емкостью 3000 $м^3$ . .		—	21,1	—
	» 5000 » . .		—	18,1	—
94	Заглубленный железобетонный резервуар для нефтепродуктов:	То же, 1962			
	емкостью 30000 $м^3$		0,051	4,22	—
	» 1000 »		0,12	8	—
95	Заглубленный открытый резервуар-отстойник емкостью 4500 $м^3$	Мосводоканалпроект (М), 1960	0,07	5,5	—
	Газгольдеры (показатели на 1 $м^3$ емкости)				
97	Шаровой газгольдер емкостью 550 $м^3$, давление 16,4 ати	Проектстальконструкция (М), 1961	0,03	158	—
98	Сухой газгольдер емкостью 5000 $м^3$ . . .	То же	—	40	—
100	Мокрый газгольдер:				
	емкостью 1000 $м^3$ . .		0,14	44,7	—
	» 15000 » . . .		0,035	16,5	—

Key: 1 - No. sheets of drawings. 2 - designation of construction. 3 - series or author and year of the issue of project. 4 - consumption of materials. 5 - concrete in m^3. 6 - steel in kg. 7 - other materials. 8 - conveyor galleries (indices on 1 m of the length of the span structure, which passes at height 14 m, including supports and foundation). 9 - gallery on steel farm/trusses. 10 - Promstroyproyekt (L). 11 - flight/span m, width m. 12 - gallery of box section from U-shaped reinforced-concrete cell/elements. 13 - Orgtekhstroy (L). 14 - gallery on composite reinforced-concrete strut plate/slabs. 15 - Promstroyproyekt (Kh). 16 - tunnels and channels (indices on 1 m of the length of construction). 17 - tunnels into one thread by internal section/cut. 18 - into two threads by internal section/cut. 19 - closed underground conduits into one thread by internal section/cut. 20 - Electroheat-plan (L). 21 - reinforced-concrete supports of steel conduit/manifolds (indices on 100 m of route). 22 - t-shaped columns 6.6 m high under load in 5 t. 23 - two-branch columns 6.6 m high under load 20 t. 24 - saltpans (indices to of 1 m^3 of the water, cooled for 1 h on 10°C. 25 - saltpan with tower from the precast reinforced concrete. 26 - asbestos cement sheets in m^2. 27 - lumber in m^3. 28 - area of irrigation m^2; productivity m^3/h; removal from 1 m^2 - m^3/h. 29 - saltpan with tower from monolithic reinforced concrete. 30 - the same. 31 - saltpan with the tower from steel framework/body, protect/surrounded by asbestos cement sheets. 32 - section of ventilator saltpan.

Key: 33 - plant ducts (indices to of 1 m^2 of the surface of shank). 34 - steel air flue; height 40 m, upper bore 2 m. 35 - steel air flue in carrying tower; height 120 m, upper bore 6.5 m. 36 - State Institute for the Planning, Research and Testing of Steel Structures and Bridges (Proyektstal'konstruktsiya) (L). 37 - monolithic reinforced-concrete chimney stack; height 120 m, upper bore 5.4 m. 38 - Teploproyekt [99sp11 - All-Union Scientific Research and Planning Institute for Heat Engineering Structures] (L). 39 - refractory lining in m^3. 40 - hoppers and silos (indices on 1 t of capacitance/capacity). 41 - relief mechanism of four hoppers by the common/general/total capacitance/capacity of 250 t of carbon with side car dumper. 42 - Electroheat-plan (Kh). 43 - construction unit. 44 - mechanical feature. 45 - hopper 180 t in capacitance of carbon (without the account of the framework/body of building). 46 - State All-Union Planning Institute for the Planning of Construction of Industrial Heat and Electric Power Plants for Supplying Power to Industrial Establishments of All Branches of the National Economy (Promenergoproyekt) (L). 47 - general-purpose silo housing with banks from the precast reinforced concrete whose diameter is 12 m, and whose capacitance/capacity is 3000 m^3 - 4000 t of cement. 48 - Promstroyproyekt (L). 49 - silo housing for grain with banks from the precast reinforced concrete whose diameter is 12 m, and whose capacitance/capacity is 3000 m^3 - 2300 t of grain. 50 - Zernoproyekt

(M). 51 - reservoirs (indices to of 1 m^3 of capacitance/capacity). 52 - water tower with tank 200 m^3 in capacitance and shank 25 m in high made of monolithic reinforced concrete. 53 - State Planning Institute for the Surveying and Planning of Outdoor Water Supply Sewer Systems and Hydraulic Engineering Structures (Vodokanalproyekt) (Kh). 54 - the same, with tank 400 m^3 in capacitance and shank 30 m in high. 55 - ground-based steel reservoir for oil-products. 56 - State Institute for the Planning of Special Structures in Industrial Construction (Giprospetspromstroy) (M). 57 - by capacitance/capacity. 58 - sunk reinforced-concrete reservoir for oil-products. 59 - sunk open reservoir-sump 4500 m^3 in capacitance. 60 - Institute for the Planning of Water Supply and Sewer System Installations of the Mosgorispolkom (Mosvodokanalproyekt) (M). 61 - gasholders (indices to of 1 m^3 of capacitance/capacity). 62 - spherical gasholder 550 m^3 in capacitance, pressure 16.4 ATI. 63 - Proyektstal'konstruktsiya (M). 64 - dry gasholder 5000 m^3 in capacitance. 65 - wet gasholder.

Page 54. Sheet 1. Classification of industrial buildings.

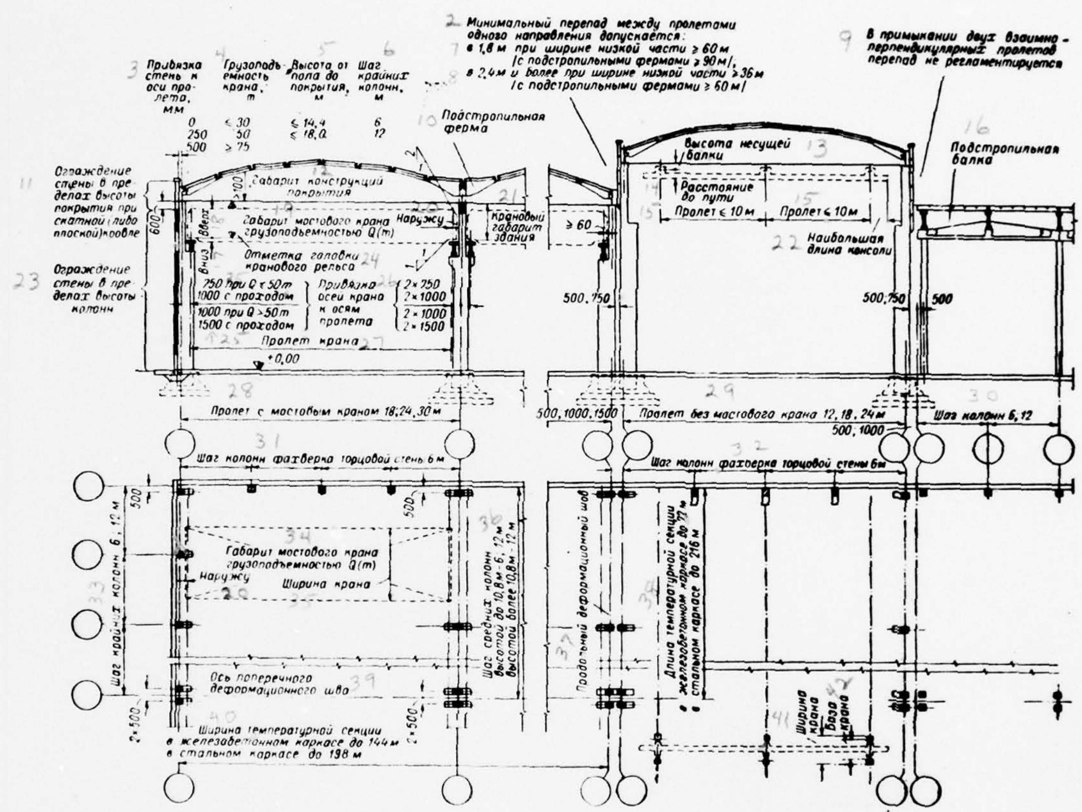


Key: 1 - buildings of solid building-up with the upper or artificial illumination of average/mean zone. 2 - buildings of pavilion building-up with the side illumination of working zone. 3 - multispan. 4 - grid of columns to 12 x of 30 m. Flight/spans are arrange/located along the production lines in one or two mutually perpendicular directions. 5 - single-span. 6 - grid of columns to 12 x of 36 m. 7 - flight/span. 8 - step/pitch. 9 - flight/spans. 10 - cellular. 11 - the grid of columns to 36 x of 36 m, close to square, makes it possible to freely maneuver with the direction of the production line. 12 - pavilion. 13 - one-two-span high, with the built-in bookstands. Grid of columns to 12 x of 36 m. 14 - hall. 15 - by width it is more than 40 m, the grid of supports more than 12 x of 36 m without internal columns makes it possible freely to maneuver for large-size machines. 16 - hall. 17 - by width to 40 m, the grid of supports more than 12 x of 36 m, enclosure/protection are opened along long side for the entrance of large-size machines. 18 - single-stage (height to the bottom of constructions to 18 m). 19 - cellular. 20 - grid of columns during girder spans to 6 x of 9 m, girderless - 6 x of 6 m. 21 - two-three-span. 22 - grid of columns to 6 x of 9 m, in lower and to 6 x of 18 m in the upper level. 23 - grid of columns to 6 x of 9 m, rarefied in the upper level. 24 - one-two-span with intertruss decks in the overlaps of production decks. Grid of the columns 6 x of 12 m. 25 - multistage (height of

deck 4.8-6.0 m). 26 - with strut constructions and raised by the method of lifting the decks. Grid of columns to 12 x of 12 m. 27 - single-span with intertruss decks in the overlaps of odd production decks. Grid of the columns 6 x of 9 m, 6 x of 27 m. 28 - mixed height. 29 - multispan with the bookstands, arrange/located between single-stage flight/spans (thermo-electric power station). Grid of columns to 12 x 45 + 12 x of 12 m. 30 - single-span with the bookstand, attached to single-stage flight/span (superstructure of the building of hydroelectric power plant). In this case the grid of columns is determined by the parameters of the block of the underwater part of the building. 31 - machine room. 32 - it is boiler. 33 - bookstand. 34 - block.

Page 55. Sheet 2. Standardized parameters of single-stage span buildings.

Привязки к разбивочным осям



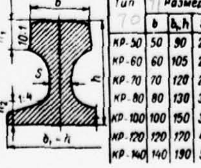
Основные параметры мостовых электрических кранов среднего режима работы по ГОСТ 3332-54, 6711-53, 534-59 и атласам кранов грузоподъемностью 350 т и более для зданий пролетом 12-36 м

Грузоподъемность, т	Пролет крана, м	Крановый габарит здания, мм	Габарит крана от оси головки рельса: Вверх, мм	Вниз, мм	Наружу, мм	Ширина крана, мм	Тип рельса
10	без проходов на 1,5 м, а с проходами на 2 м менее пролета здания	2250	1900	250-900 по мере увеличения пролета	260	6300	КР-50
20/5		2650	2400				КР-60
30/5		2950	2750		300		КР-70
50/10		3350	3150			6650	КР-80
75/20	без проходов на 2 м, с одним проходом на 2,5 м, с двумя проходами на 3 м менее пролета здания	4000, при пролете ≥ 24 м 4400	3700, 4000	250	400	8800	КР-100
100/20							КР-120
150/30		5700	4800		500	9900	
200/30						10400	
250/30		5200, при пролете 36 м 5600	4800, 5200				
350/75+ +10		6400, при пролете 36 м 6800	6100, 6500			10850	КР-140
500/125+ +10		7400, при пролете 36 м 7800	7100, 7500		650	13000	

Основные параметры подвесных одноблочных электрических кранов по ГОСТ 7890-56

Грузоподъемность, т	Пролет, м	Консоль, м	Несущая балка I N	Расстояние до пути, м	База крана, м	Ширина крана, м
1	8	1	24	0,65	1,5	2,25
	12	1,6	36		1,8	2,5
2	8	1	30		1,5	2,3
	12	1,6	45	0,75		
3	10	1,4				2,4
5			50	0,95	1,8	3,4

Крановые рельсы по ГОСТ 4121-62



Тип	Размеры, мм: b	b_1, h	S	h_1	h_2
КР-50	50	90	20	25	20
КР-60	60	105	24	27,5	22
КР-70	70	120	28	32,5	24
КР-80	80	130	32	35	26
КР-100	100	150	38	40	30
КР-120	120	170	44	45	35
КР-140	140	190	50	50	40

Унифицированные параметры одноэтажных зданий, оборудованных мостовыми кранами грузоподъемностью до 50 т

Отметка головки кранового рельса, м			6,15	6,95	8,15	9,65	11,45	12,65*	14,45*
Крановый габарит здания, м			2,25	2,65		2,95		3,55*	
Отметка низа конструкции покрытия, м			8,4	9,6	10,8	12,6	14,4	16,2	18,0
Шаг колонн, м	крайних		6 или 12						
	средних		6 или 12			12			
Пролет здания, м	18	Грузоподъемность кранов, т	10	10; 20/5		10, 20/5, 30/5			
	24							30/5; 50/10	
	30								

*) Для кранов грузоподъемностью 50/10 т отметка головки рельса повышается на 0,2 м и соответственно уменьшается крановый габарит

Унифицированные параметры одноэтажных зданий, оборудованных подвесными однобалочными кранами грузоподъемностью до 5 т

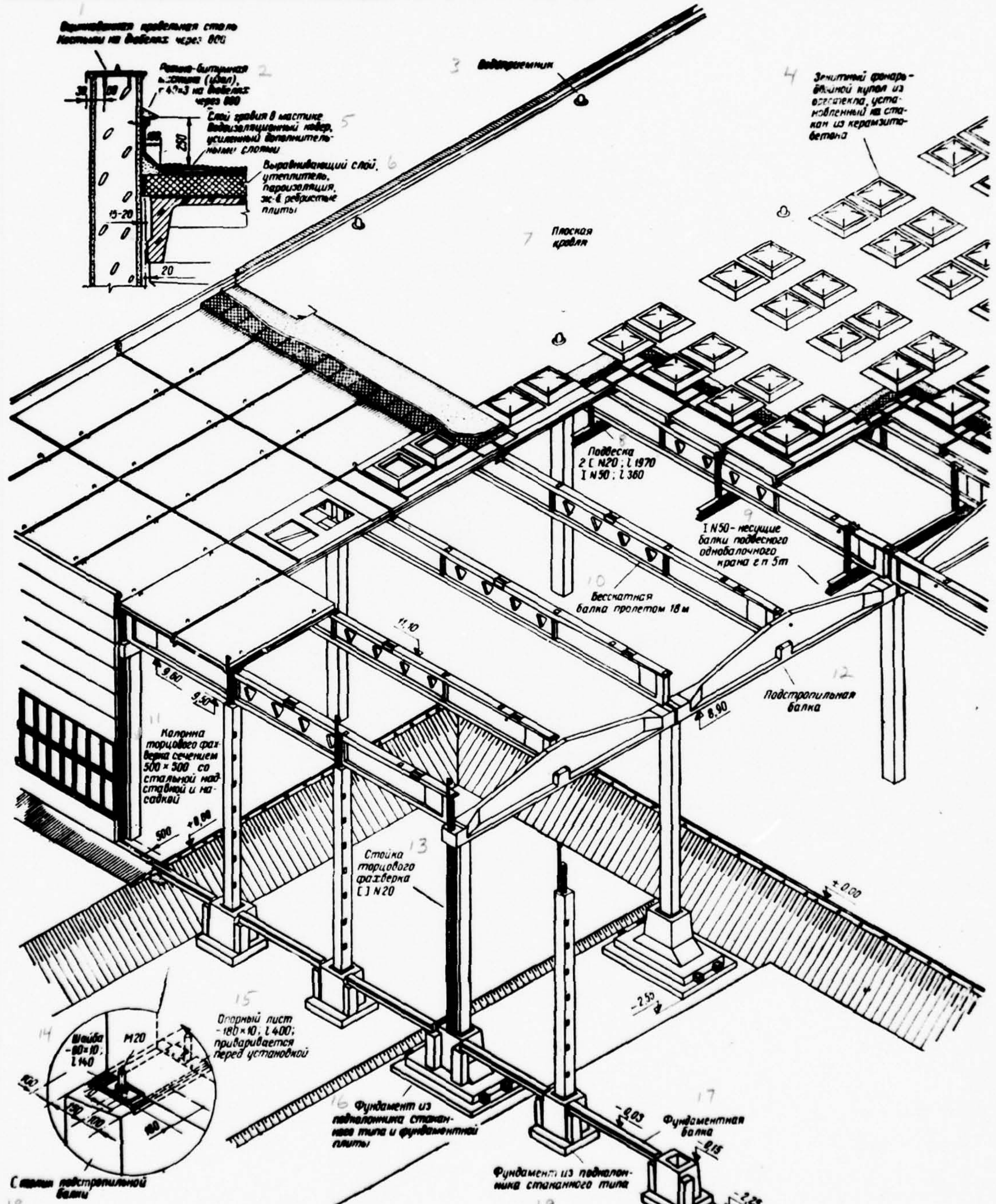
Отметка низа конструкций покрытий, м			3,6	4,2	4,8	6,0	7,2	8,4	9,6	10,8	12,6
Пролет здания, м	12	Шаг колонн, м	6								
	18				6 или 12			крайних 6 или 12, средних 12			
	24										

Key: 1 - joinings to center lines. 2 - the minimum jump/drop between the flight/spans of one direction it is allow/assumed. 3 - joining of wall to axle/axis flight/spans, mm. 4 - crane load, t. 5 - height from sex/floor to coating, m. 6 - step/pitch of extreme columns, m. 7 - 1.8 m with the width of the low part > of 60 m [with the frame-supporting farm/trusses > of 90 m]; 8 - 2.4 m and more with the width of the low part > of 36 m [with the frame-supporting farm/trusses > of 60 m]. 9 - In the contiguity of two mutually perpendicular flight/spans jump/drop is not regulated. 10 - frame-supporting farm/truss. 11 - enclosure/protection of wall in the altitude limits of coating with sloping (or flat/plane) roofing. 12 - dimension of the constructions of coating. 13 - height of the carrier beam. 14 - distances of way. 15 - flight/span. 16 - frame-supporting beam. 17 - downward. 18 - upward. 19 - dimension of the bridge crane by load capacity Q(t). 20 - outside. 21 - crane dimension of building. 22 - maximum overhanging length. 23 - enclosure/protection of wall in the altitude limits of columns. 24 - mark of the knob/cap of crane rail. 25 - with ... with pass. 26 - joining of the axle/axes of tap/crane to the axle/axes of flight/span. 27 - flight/span of tap/crane. 28 - flight/span with the bridge crane. 29 - flight/span without the bridge crane. 30 - step/pitch of columns. 31 - step/pitch of the columns of the framework of end-type wall 6 m. 32 - step/pitch of the columns of the framework of end-type wall 6 m. 33 - step/pitch

of extreme columns. 34 - dimension of the bridge crane by load capacity Q(t). 35 - width of tap/crane. 36 - step/pitch of average/mean columns, by height to 10.8 m 6, 12 m; by height are more than 10.8 m of -12 m. 37 - longitudinal deformation weld. 38 - length of temperature section in reinforced-concrete framework/body to 72 m, in steel framework/body to 216 m. 39 - axle/axis of transverse deformation weld. 40 - width of temperature section in reinforced-concrete framework/body to 144 m, in steel framework/body to 198 m. 41 - width of tap/crane. 42 - base of tap/crane. 43 - the basic parameters of the travelling electric cranes of moderate duty of work according to GOST 3332-54, 6711-53, 534-59 and atlases of tap/cranes by load capacity 350 t and more for buildings by flight/span 12-36 m. 44 - basic parameters of suspension single-beam electrical tap/cranes according to GOST 7890-56. 45 - standardized parameters of the single-story buildings, equipped with the bridge cranes by load capacity to 50 t. 46 - load capacity, t. 47 - flight/span of tap/crane, m. 48 - crane dimension of building, mm. 49 - dimension of tap/crane from the axle/axis of the knob/cap of rail. 50 - type of rail. 51 - flight/span. 52 - arm. 53 - carrier beam. 54 - distance of way. 55 - mark of the knob/cap of crane rail. 56 - crane dimension of building. 57 - mark of the bottom of the construction of coating. 58 - without passes on 1.5 m, but with passes on 2 m it is less than the flight/span of building. 59 - 250-960 with an increase in the flight/span. 60 - step/pitch of

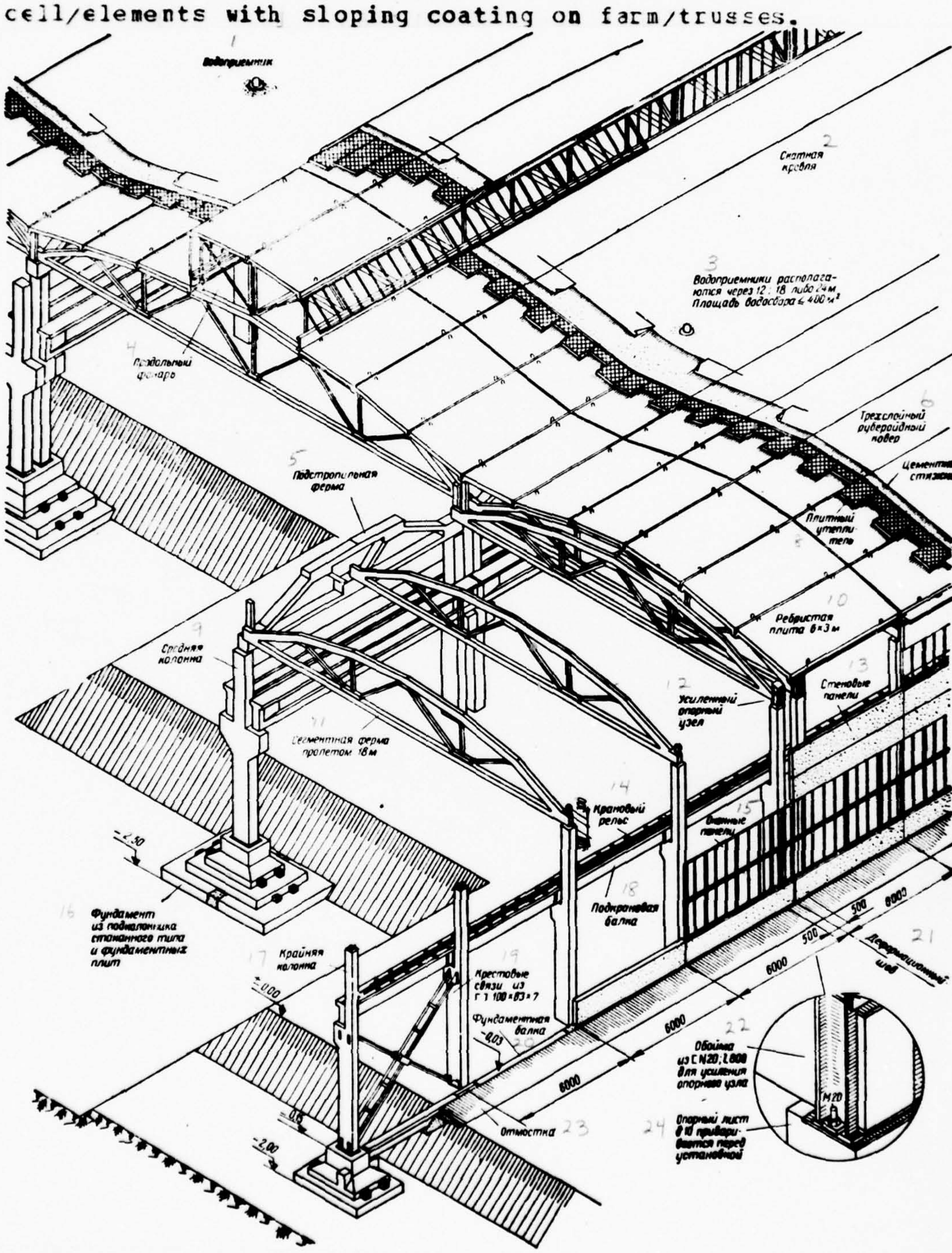
columns. 61 - extreme. 62 - the averages. 63 - or. 64 - without passes on 2 m, with one pass on 2.5 m, with two passes on 3 m it is less than the flight/span of building. 65 - with flight/span. 66 - crane rails according to GOST 4121-62. 67 - *) for tap/cranes with capacity 50/10 t the mark of the knob/cap of rail is raised on 0.2 m and with respect is decreased crane dimension. 70 - type. 71 - size/dimensions. 72 - standardized parameters of the single-story buildings, equipped with suspension single-beam tap/cranes by load capacity to 5 t. 73 - mark of the bottom of the constructions of coating. 74 - extreme 6 or 12, the averages 12.

Page 56. Sheet 3. Single-stage craneless building from the standardized cell/elements with flat/plane coating on beams.



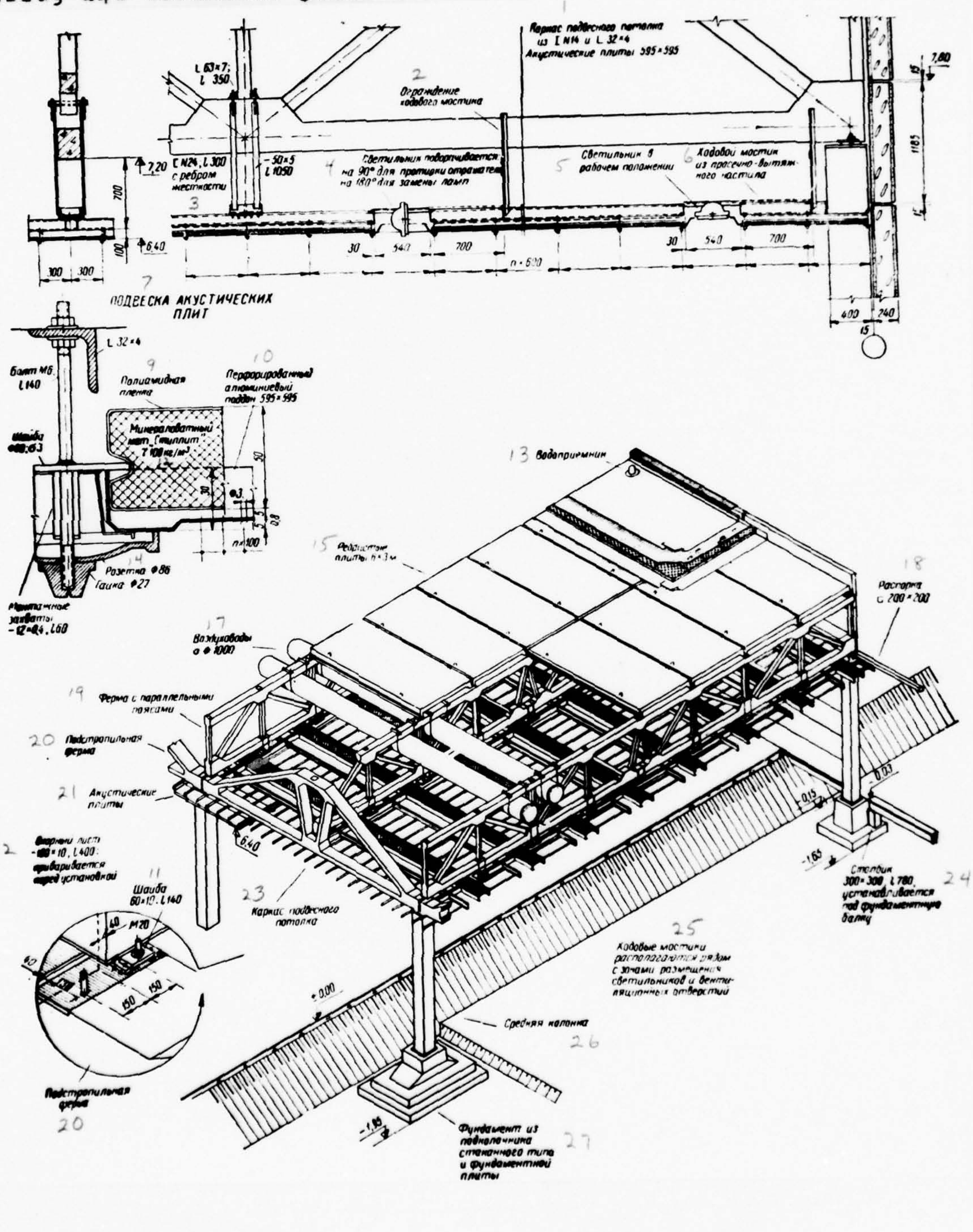
Key: 1 - zinc-coated roofing steel. Crutches on the dowels through 800. 2 - rubber-asphalt mastic (Izol), 40 x 3 on the dowels through 600. 3 - water intake. 4 - zenith lamp/canopy-double cupola from fiberglass, establish/installed to beaker/sleeve from keramzit concrete. 5 - layer of gravel in mastic. Water-insulating carpet, intensified by additional layers. 6 - leveling layer, heater, steam insulation, reinforced concrete ribbed slabs. 7 - flat/plane roofing. 8 - suspension. 9 - carrier beams of the suspension single-beam tap/crane capacity 5 t. 10 - nonsloping beam with span. 11 - column of end-type framework by section/cut 500 x 500 with steel extension and cap/filling. 12 - frame-supporting beam. 13 - strut of end-type framework. 14 - washer. 15 - supporting/reference sheet; are welded before the installation. 16 - foundation from the base of the glass type and the base plate. 17 - foundation beam. 18 - Mount for frame-supporting beam. 19 - foundation from the base of the glass type.

Page 57. Sheet 4. The single-story building from the standardized cell/elements with sloping coating on farm/trusses.



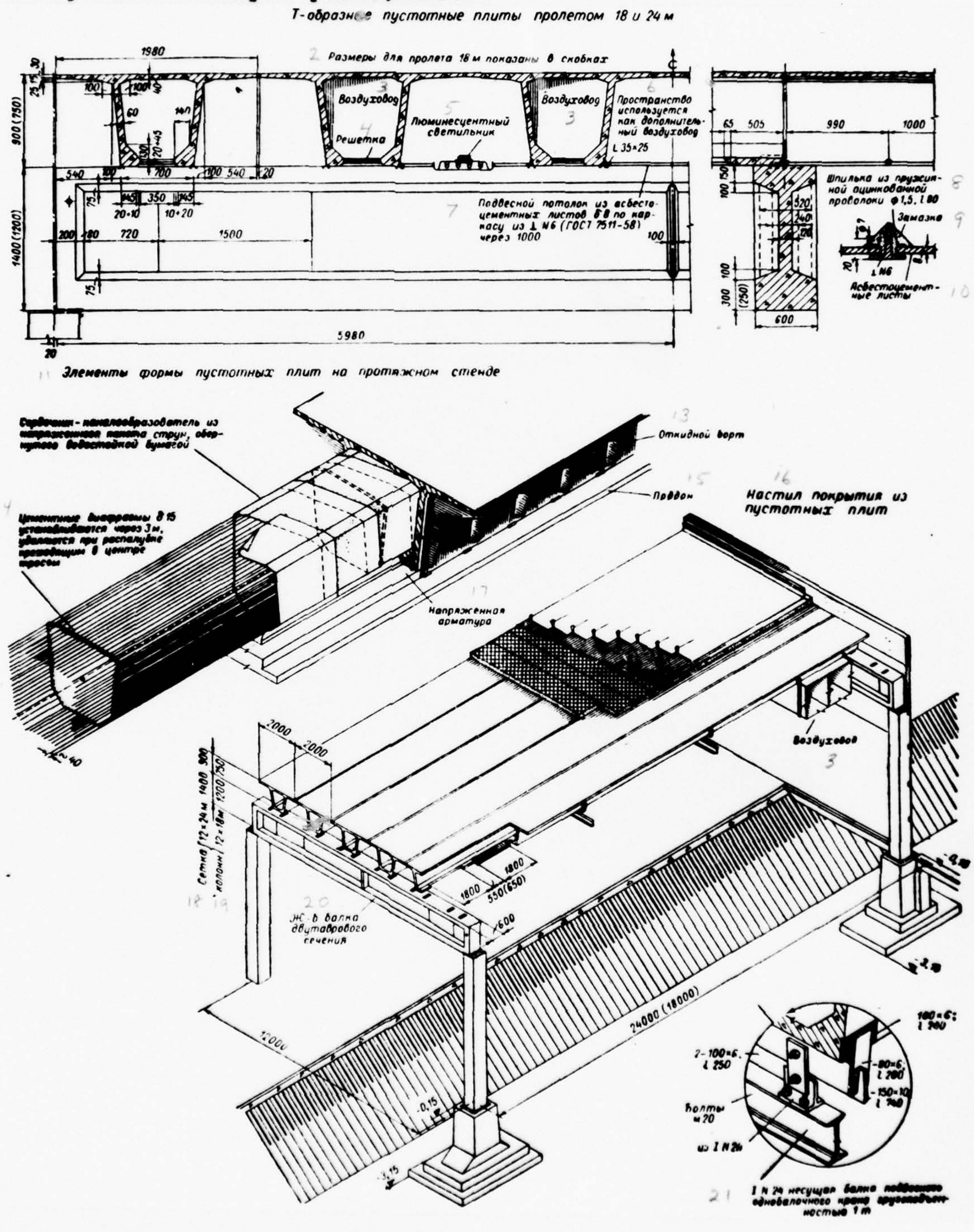
Key: 1 - water intake. 2 - sloping roofing. 3 - waters intake are furnished through 12, 18 or 24 m. Area of the catchment < of 400 m^2. 4 - longitudinal lamp/canopy. 5 - frame-supporting farm/truss. 6 - three-layered ruberoid carpet. 7 - cement tie piece. 8 - plate heater. 9 - average/mean column. 10 - ribbed slab. 11 - segmental farm/truss by flight/span. 12 - intensive supporting unit. 13 - wall panels. 14 - crane rail. 15 - window panels. 16 - foundation from the base of the glass type and the base plates. 17 - extreme column. 18 - crane beam. 19 - cross bonds from. 20 - foundation beam. 21 - deformation weld. 22 - ring from [N20;1800 for strengthening the supporting unit. 23 - blind area. 24 - supporting/reference sheet b 10 it is welded before the installation.

Page 58. Sheet 5. Cell of the single-story building with flat/plane roofing and technical garret.



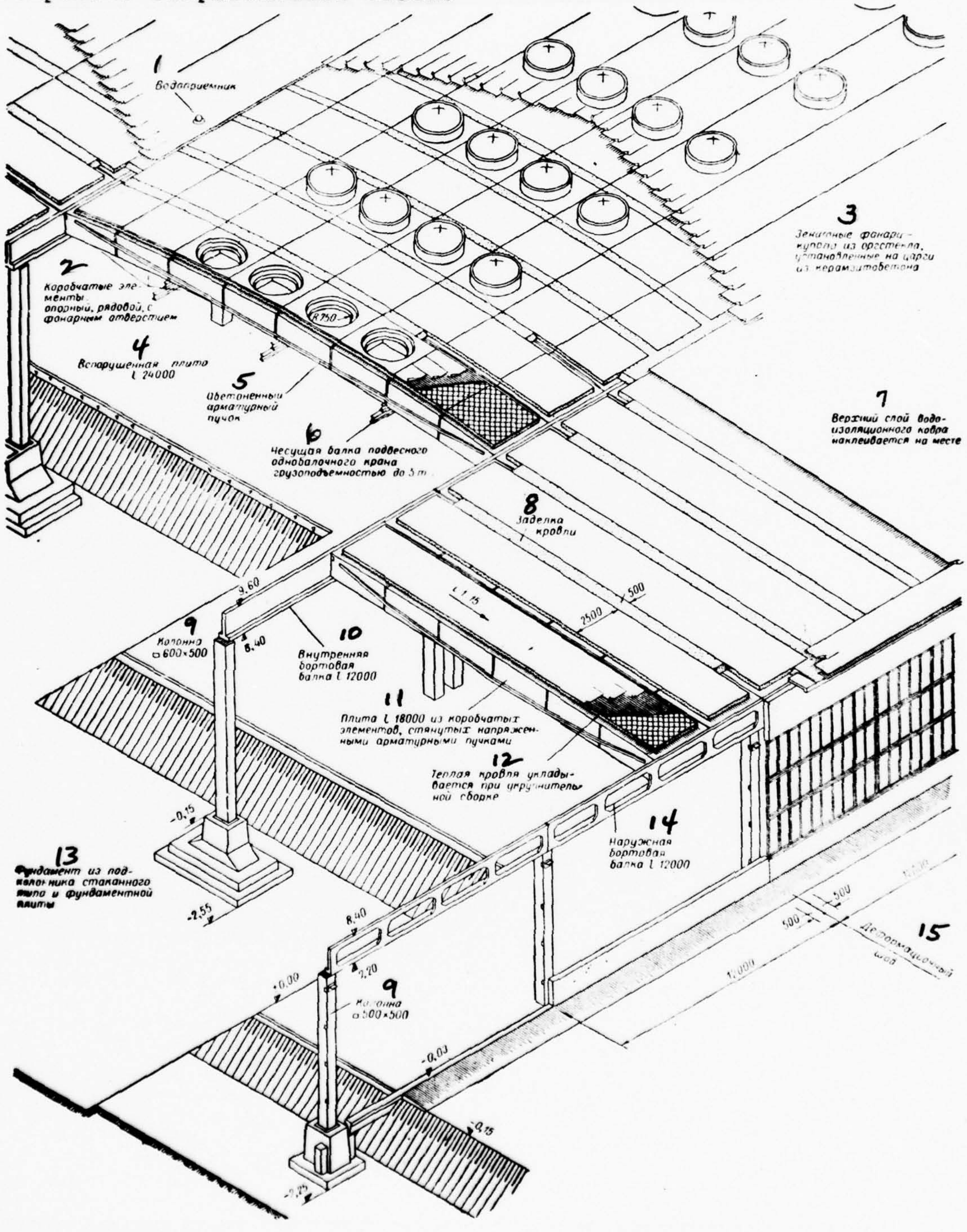
Key: 1 - framework/body of suspension ceiling from I N 14 and L 32 x 4. Acoustic plate/slabs. 2 - enclosure/protection of the pilot bridge. 3 - with stiffening rib. 4 - illuminating lamp it is turned: on 90° for the rub of reflector, on 180° for the replacement of lamps. 5 - illuminating lamp in operating position. 6 - pilot bridge from cut and drawn flooring. 7 - suspension of acoustic plate/slabs. 8 - bolt. 9 - poliamide film. 10 - perforated/punched aluminum par/pallet. 11 - washer. 12 - mineral wool matte finish "stillite" γ 100 kg/m^3. 13 - water intake. 14 - baffle/socket, nut. 15 - ribbed slabs. 16 - assembling captures. 17 - air ducts. 18 - spacer. 19 - Fermat with parallel belt/zones. 20 - frame-supporting farm/truss. 21 - acoustic plate/slabs. 22 - supporting/reference sheet: are welded before the installation. 23 - framework/body of suspension ceiling. 24 - column, it is installed under foundation beam. 25 - the pilot bridges they are furnished next to the zones of the arrangement/position of illuminating lamps and vent holes. 26 - average/mean column. 27 - foundation from the base of the glass type and the base plate.

Page 59. Sheet 6. Cell of the single-story building with flat/plane roofing from t-shaped plate/slabs.



Key: 1 - t-shaped vacuum plate/slabs by flight/span 18 and 24 m. 2 - size/dimensions for a flight/span 18 m are shown in brackets. 3 - air duct. 4 - grate. 5 - luminescent illuminating lamp. 6 - space it is utilized as additional air duct. 7 - suspension ceiling from asbestos cement sheets b 8 on framework/body from N6 (GOST 7511-58) through 1000. 8 - pin from the spring zinc-coated wire. 9 - cement. 10 - asbestos cement sheets. 11 - cell/elements of the form of vacuum plate/slabs on drawn-out bench. 12 - core-channel-former from the stressed bundle of cross-braces, wrapped up hydrostable paper. 13 - flap. 14 - cement diaphragms b 15 they are establish/installed within 3 m, they are removed with the removal of the molds by the passing in center cable. 15 - pan/pallet. 16 - flooring of coating from vacuum plate/slabs. 17 - stressed fittings. 18 - grid. 19 - columns. 20 - reinforced concrete beam of double-T section/cut. 21 - I N 24 the carrier beam of suspension single-beam tap/crane by load capacity 1 t.

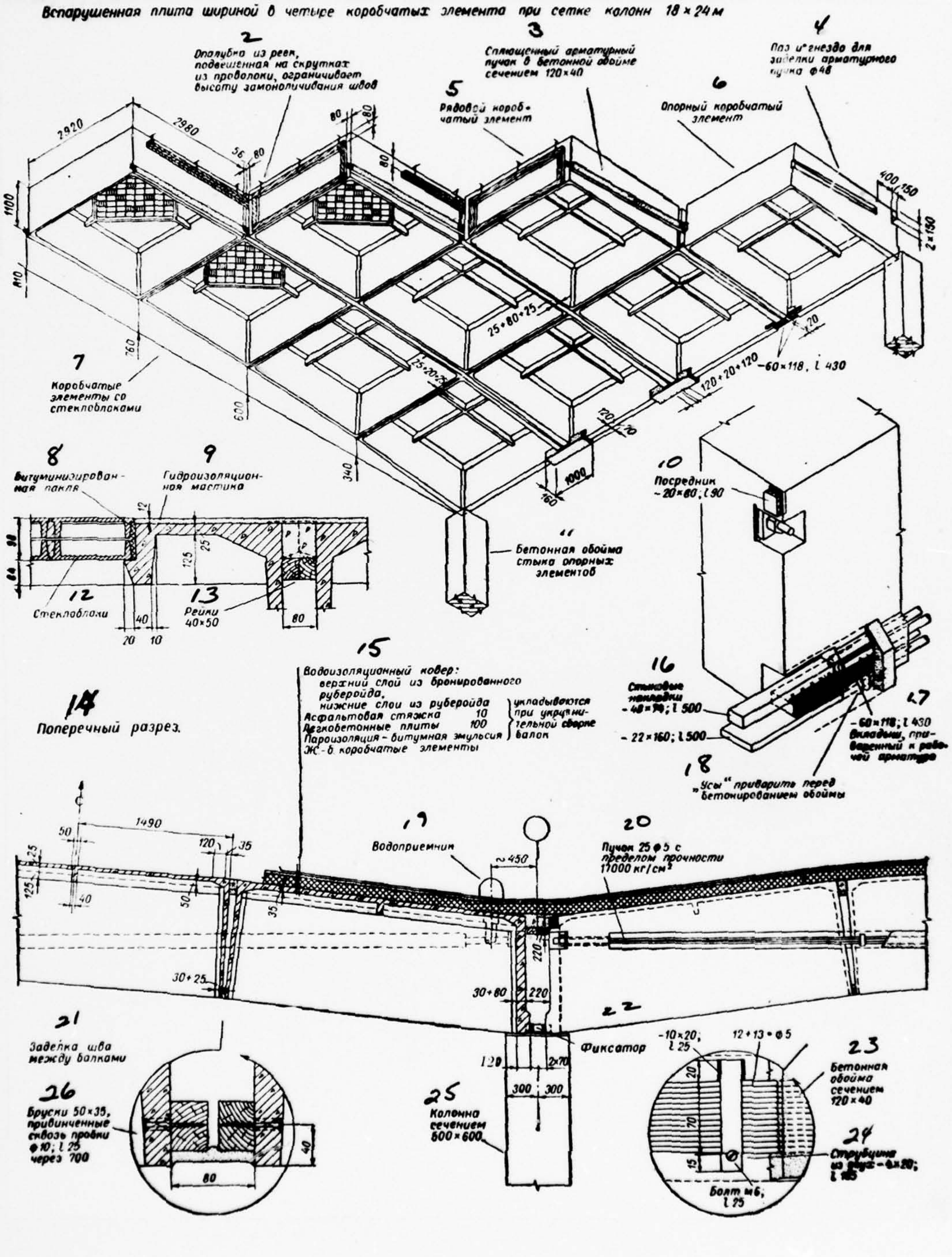
Page 60. Sheet 7. The single-story building with coating from composite compartmented slats.



Key: 1 - water intake. 2 - box cell/elements: supporting/reference, series with lantern hole. 3 - zenith skylights-cupolas from fiberglass, establish/installed to tubular furnace sections from keramzit concrete. 4 - paired plate/slab. 5 - concreted reinforcing beam. 6 - support beam of suspension single-beam tap/crane with capacity up to 5 t. 7 - the upper layer of water-insulating carpet it is stuck on the spot. 8 - framing of roofing. 9 - column .... 10 - internal side beam .... 11 - plate/slab ... from the box cell/elements, tightened by the stressed reinforcing beams. 12 - warm roofing it is packed with consolidation assembly. 13 - foundation from the base of the glass type and the base plate. 14. External side beam .... 15 - deformation weld.

Sheet 8. Plate/slab from box cell/elements.

Вспарушенная плита шириной в четыре коробчатых элемента при сетке колонн 18 × 24 м



Key: 1 - paired plate/slab with a width of into four box cell/elements with the grid of columns .... 2 - the planking from racks, suspend/hung from twists from wire, it limits the height of the monolithization of welds. 3 - flattened reinforcing beam in concrete ring by section/cut .... 4 - groove/slot and seat/socket for the framing of reinforcing beam .... 5 - series box cell/element. 6 - supporting/reference box cell/element. 7 - box cell/elements with glass blocks. 8 - bituminized oakum. 9 - moisture-proof mastic. 10 - intermediary .... 11 - concrete ring of the joint of supporting/reference cell/elements. 12 - glass blocks. 13 - racks .... 14 - cross section. 15 - water-insulating carpet: upper layer from the armor plated rubercid, bottom layers from ruberoid.

Asphalt tie piece. are packed

light-concrete plate/slabs. with the consolidation

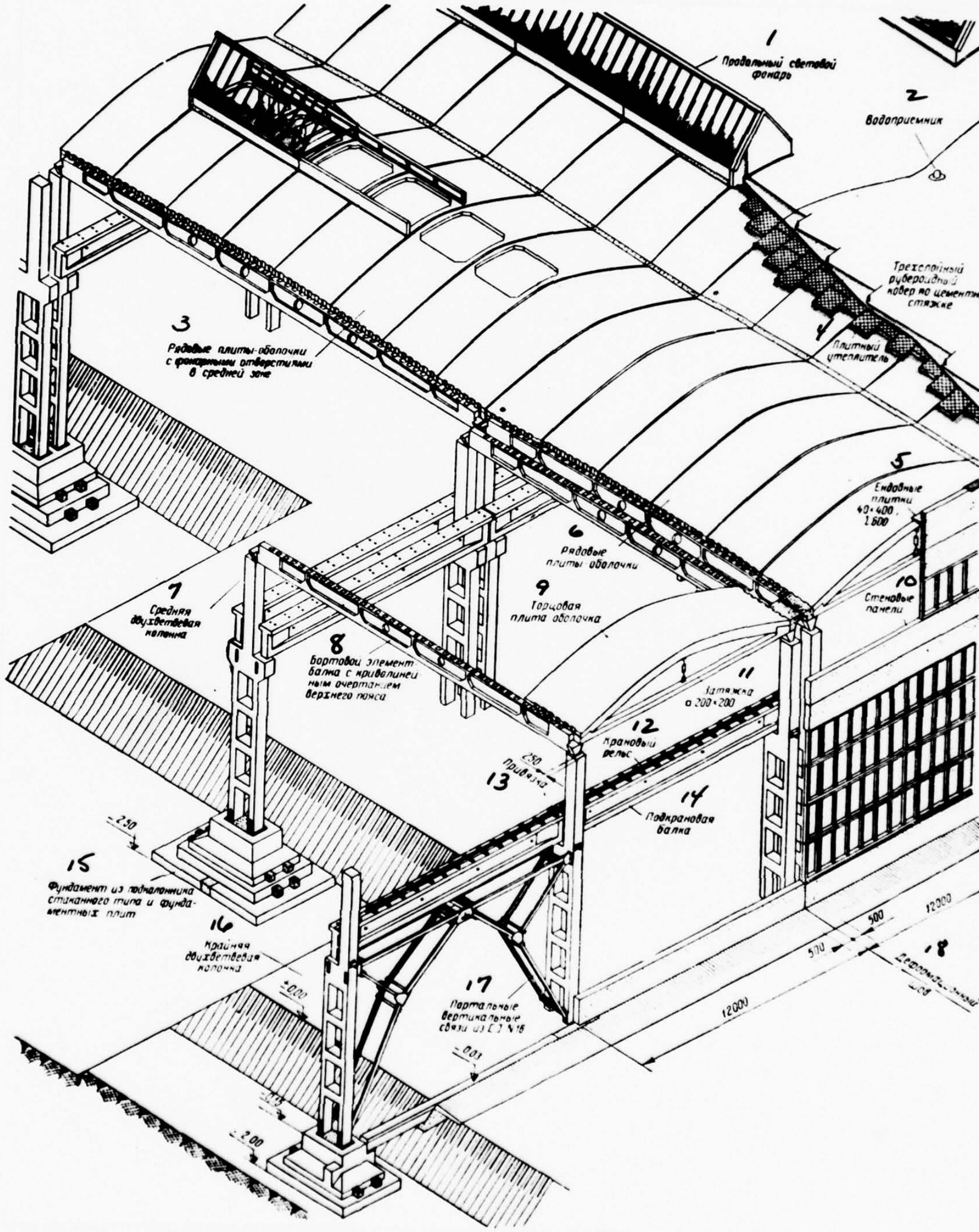
steam insulation - bitumen emulsion. to the assembly of beams.

... box cell/elements.

16 - cover plates .... 17 - ... the insert/bushing, welded to working fittings. 18 - "whiskers" to weld before the concreting of ring. 19 -

water intake. 20 - beam.... with ultimate strength.... kg/cm². 21. Framing of weld between beams. 22 - clamping fixture. 23 - concrete ring by section/cut .... 24 - clamp from two - .... 25 - column by section/cut .... 26 - bars...., screwed down through plugs ... through ....

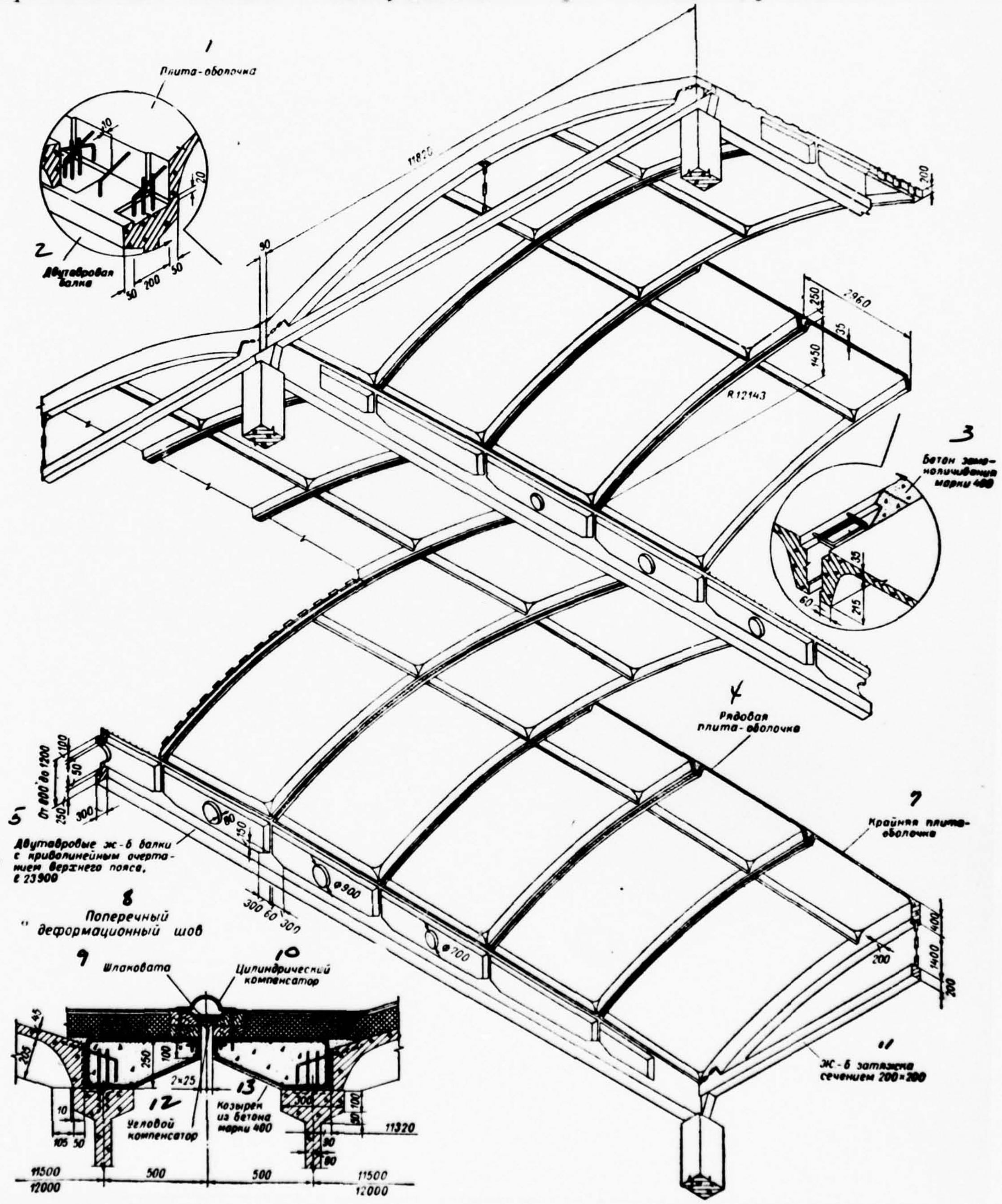
Sheet 9. The single-story building with coating from cylindrical shells.



Key: 1 - longitudinal light lamp/canopy. 2 - water intake. 3 - series plate/slab-shells with lantern holes in middle average/mean zone. 4 - plate heater. 5 - valley slabs .... 6 - series plate/slab-shells. 7 - middle two-branch column. 8 - side cell/element-beam with the curvilinear configuration of upper belt/zone. 9 - end-type plate/slab-shell. 10 - wall panels. 11 - tightening .... 12 - crane rail. 13 - joining. 14 - crane beam. 15 - foundation from the base of the glass type and the base plates. 16 - extreme two-branch column. 17 - portal vertical communication/connections from .... 18 - deformation weld.

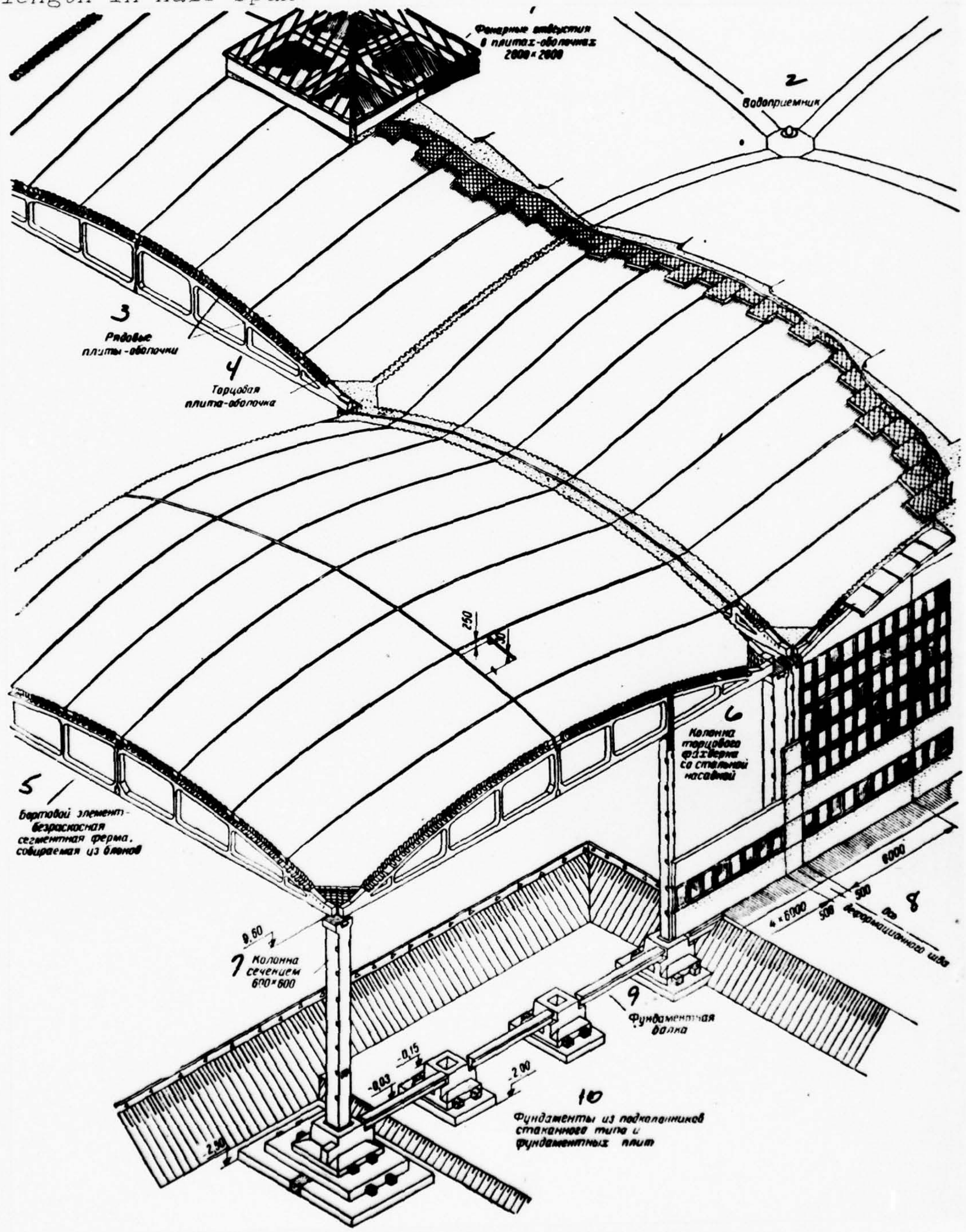
Sheet 10.

Cylindrical shells - cell/elements and assembling units.



Key: 1 - plate/slab-shell. 2 - H-beam. 3 - concrete of the monolithization of mark/brand .... 4 - series plate/slab-obolocko/ 5 - from 800 to 1200. 6 - double-T beams with the curvilinear configuration of upper belt/zone, ... 7 - outer plate/slab-shell. 8 - transverse deformation weld. 9 - slag wool. 10 - cylindrical compensator. 11 - tightening by section/cut ..... 12 - angular compensator. 13 - deflector from concrete of mark/brand ....

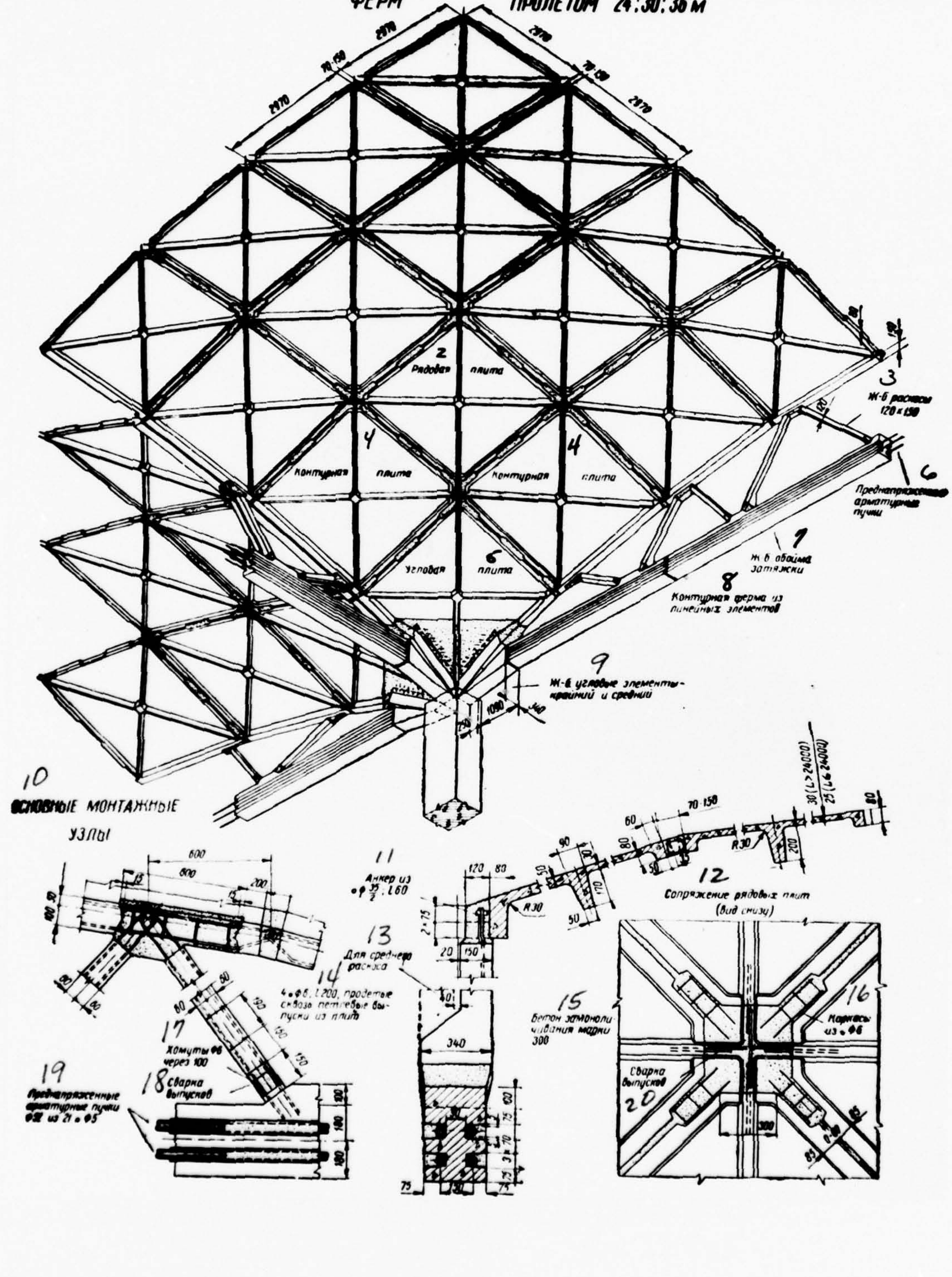
Sheet 11. The single-story building with coating from the spherical shells, collected from cylindrical plate/slabs with length in half-span.



Key: 1 - lantern holes in plate/slab-shells .... 2 - water intake. 3 - series plates- shells. 4 - end-type plate/slab-shell. 5 - side cell/element-nonslanting segmental farm/truss, assembled from blocks. 6 - column of end-type framework with steel cap/filling. 7 Column by section/cut .... 8 - axle/axis of deformation weld. 9 - foundation beam. 10 - foundations from the bases of the glass type and the base plates.

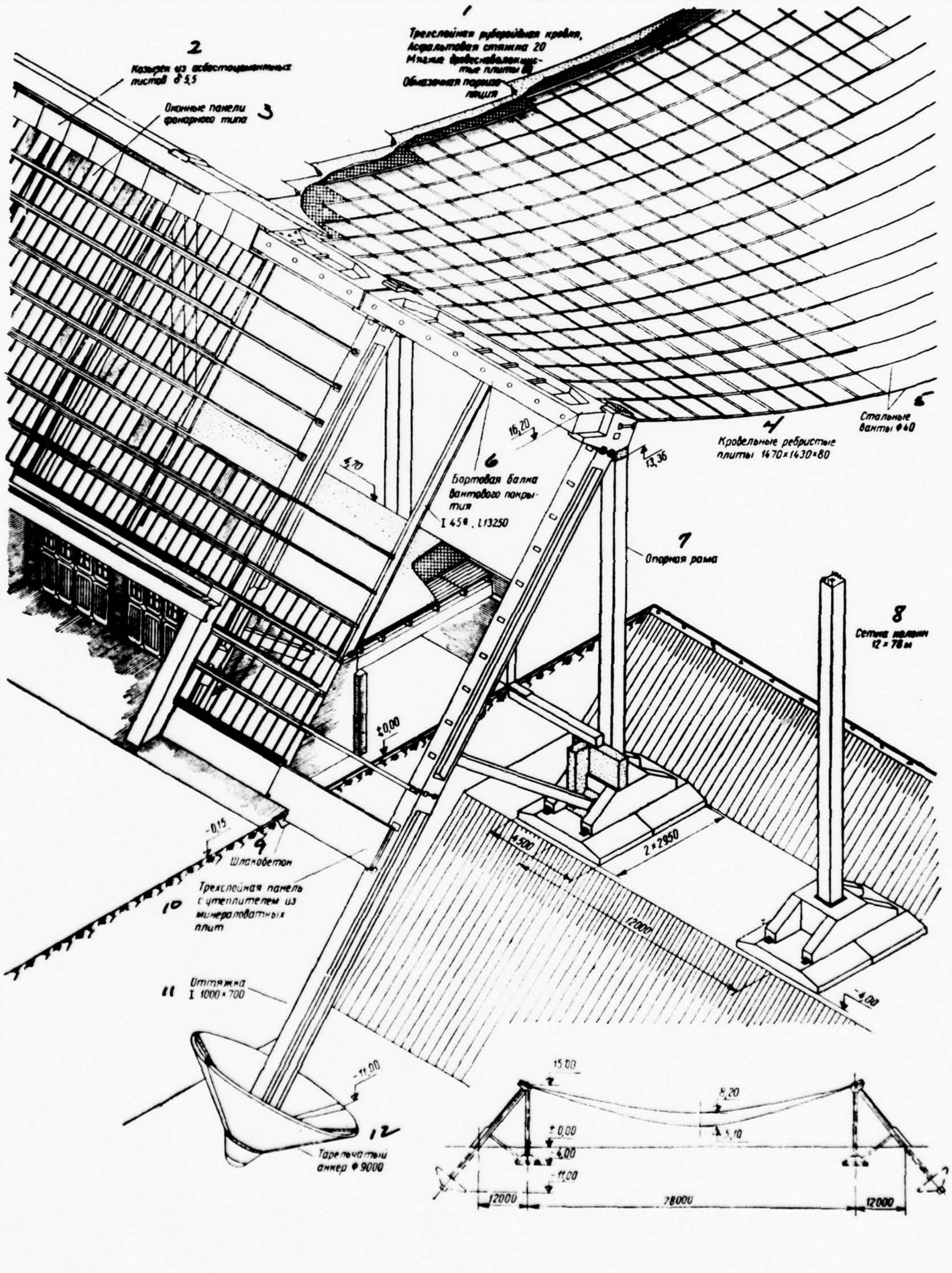
Sheet 12. Spherical shells of flat/plane square plate/slabs.

' СБОРНЫЕ ЖЕЛЕЗОБЕТОННЫЕ ОБОЛОЧКИ СО СФЕРИЧЕСКОЙ ПОВЕРХНОСТЬЮ ИЗ ПЛИТ 3×3 м И КОНТУРНЫХ ФЕРМ ПРОЛЕТОМ 24; 30; 36 м



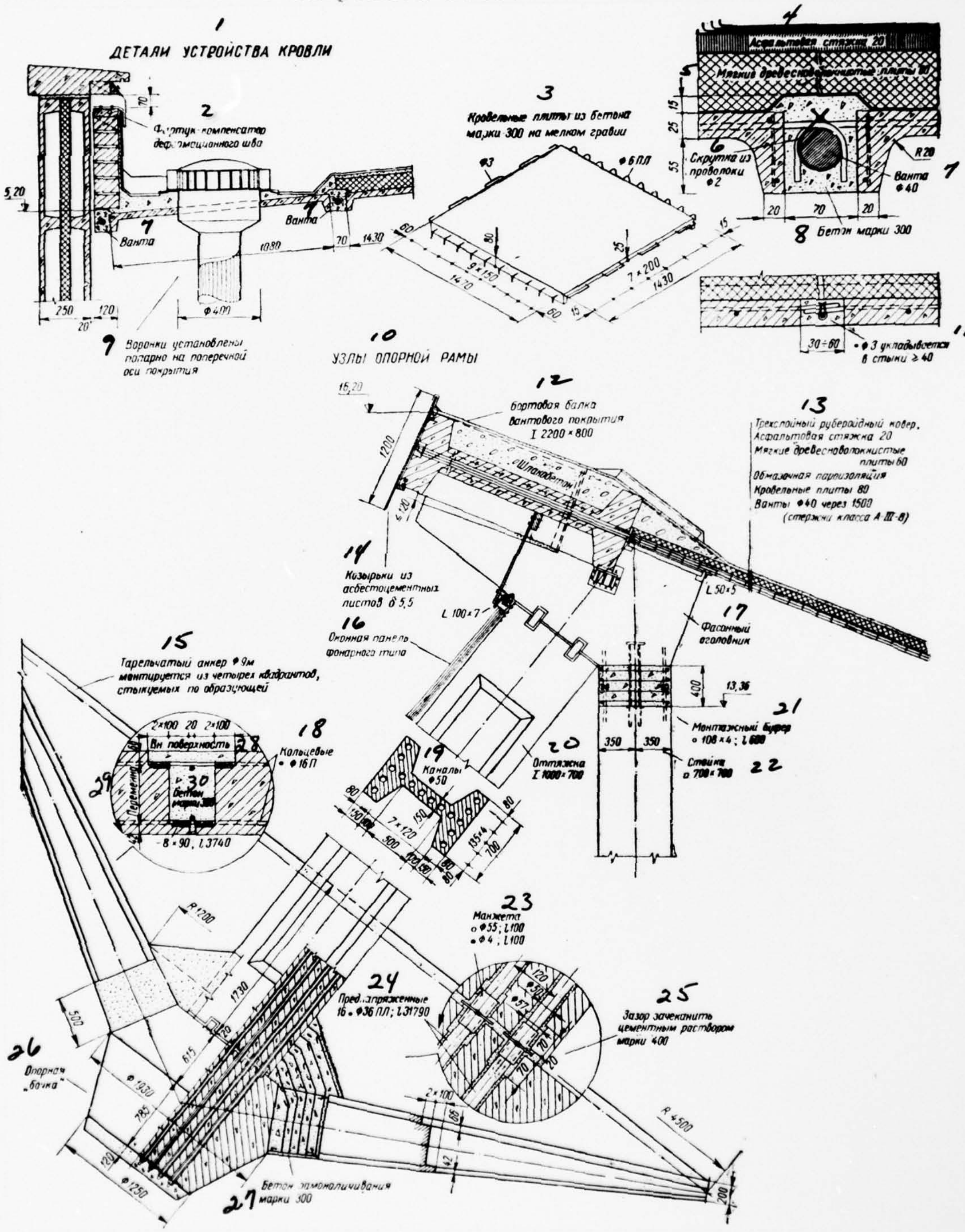
Key: 1 - composite reinforced-concrete shells with spherical surface from plate/slabs 3 x 3 m and contour farm/trusses with span 24; 30; 36 m. 2 - series plate/slab. 3 - struts .... 4 - contour plate/slab. 5 - angular plate/slab. 6 - prestressed reinforcing beams. 7 - the ring of tightening. 8 - contour farm/truss from linear cell/elements. 9 - angular cell/element-extreme and middle. 10 - the basic assembly units. 11 - anchor from .... 12 - coupling of series plate/slabs (bottom view). 13 - for middle strut. 14 - ..., passed through through loop issues from plate/slabs. 15 - concrete of the monolithization of mark/brand .... 16 - framework/bodies from .... 17 - clamps ... through .... 18 - welding issues. 19 - prestressed reinforcing beams ... from ..... 20 - welding issues.

Sheet 13. The single-story building with suspended roof.



Key: 1 - three-layered ruberoid roofing, asphalt tie piece 20. Soft wood-fiber boards 60. Coating of steam insulation. 2 - deflector from asbestos cement sheets .... 3 - lantern type window panels. 4 - roofing ribbed slabs .... 5 - steel guys .... 6 - side beam of guy coating. 7 - supporting frame. 8 - grid of columns ..... 9 - slag concrete. 10 - sandwich with heater from mineral wool plate/slabs. 11 - drawing cut .... 12 - plate anchor ....

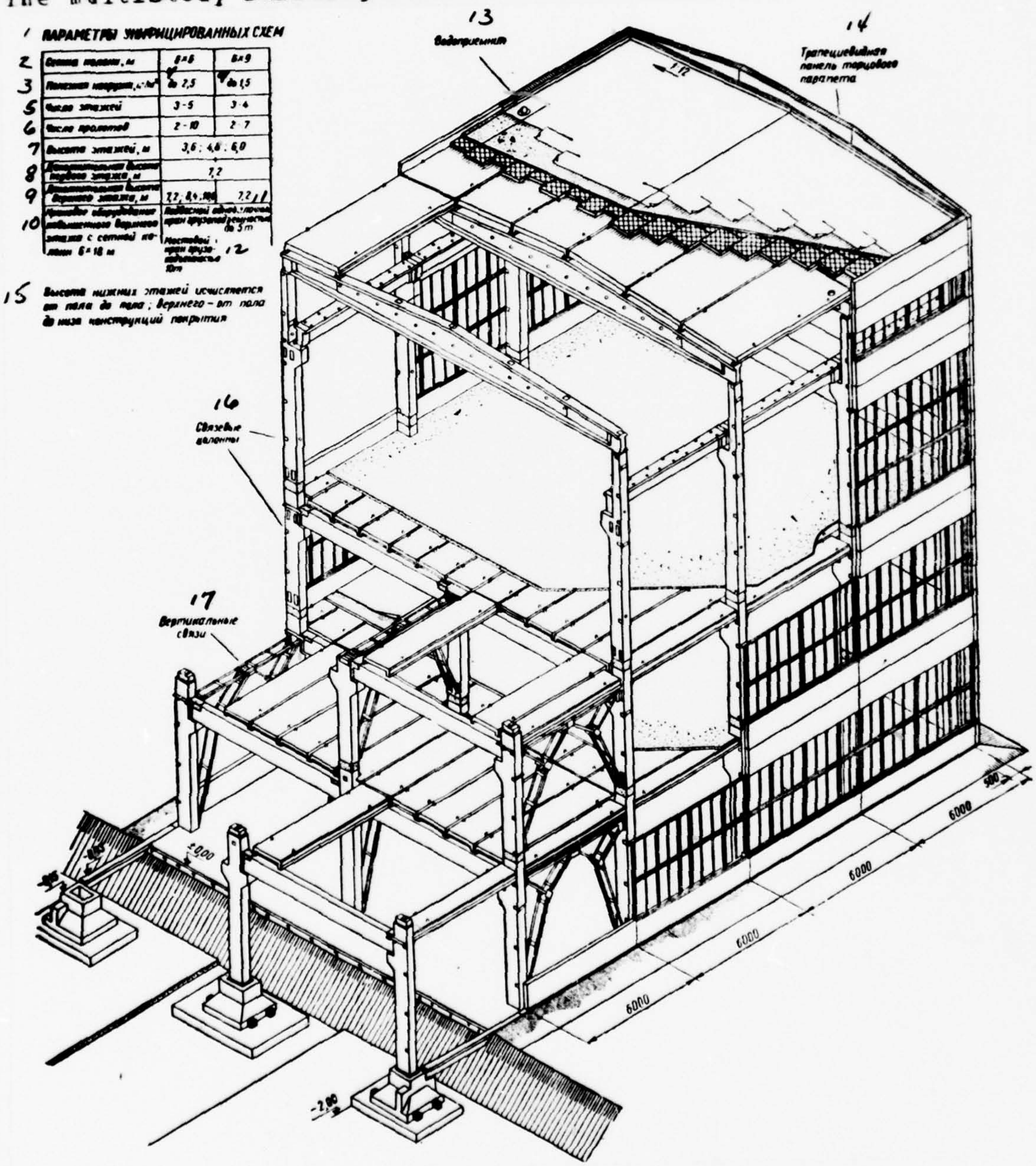
Sheet 14. Parts of suspended roof.



Key: 1 - parts of the device of roofing. 2 - apron- compensator of deformation weld. 3 - roofing sheeting from concrete of brand 300 on small gravel. 4 - asphalt tie piece 20. 5 - soft wood-fiber plate/slabs 60. 6 - twist from wire .... 7 - guy .... 8 - concrete of brand 300. 9 - funnels are establish/installed in pairs on the transverse axis of coating. 10 - units of supporting frame. 11 - ... are packed in joints .... 12 - on-board beam of guy coating .... 13 - three-layered ruberoid carpet, asphalt tie piece 20. Soft wood-fiber boards 60. Coating of steam insulation. Roofing sheeting 80. Guys ... through 1500 (rods of class .... 14 - deflectors from asbestos-cement sheets .... 15 - plate anchor ... it is installed of four quadrants, butted on generatrix. 16 - lantern type window panel. 17 - shaped cap. 18 - circular. 19 - channels .... 20 - drawing out .... 21 - assembling buffer .... 22 - strut .... 23 - sealing ring .... 24 - prestressed .... 25 - clearance to caulk by cement mortar of brand 400. 26 - supporting/reference of "flank". 27 - concrete embedment of brand 300. 28 - outer surface. 29 - it is alternate. 30 - concrete of brand 300.

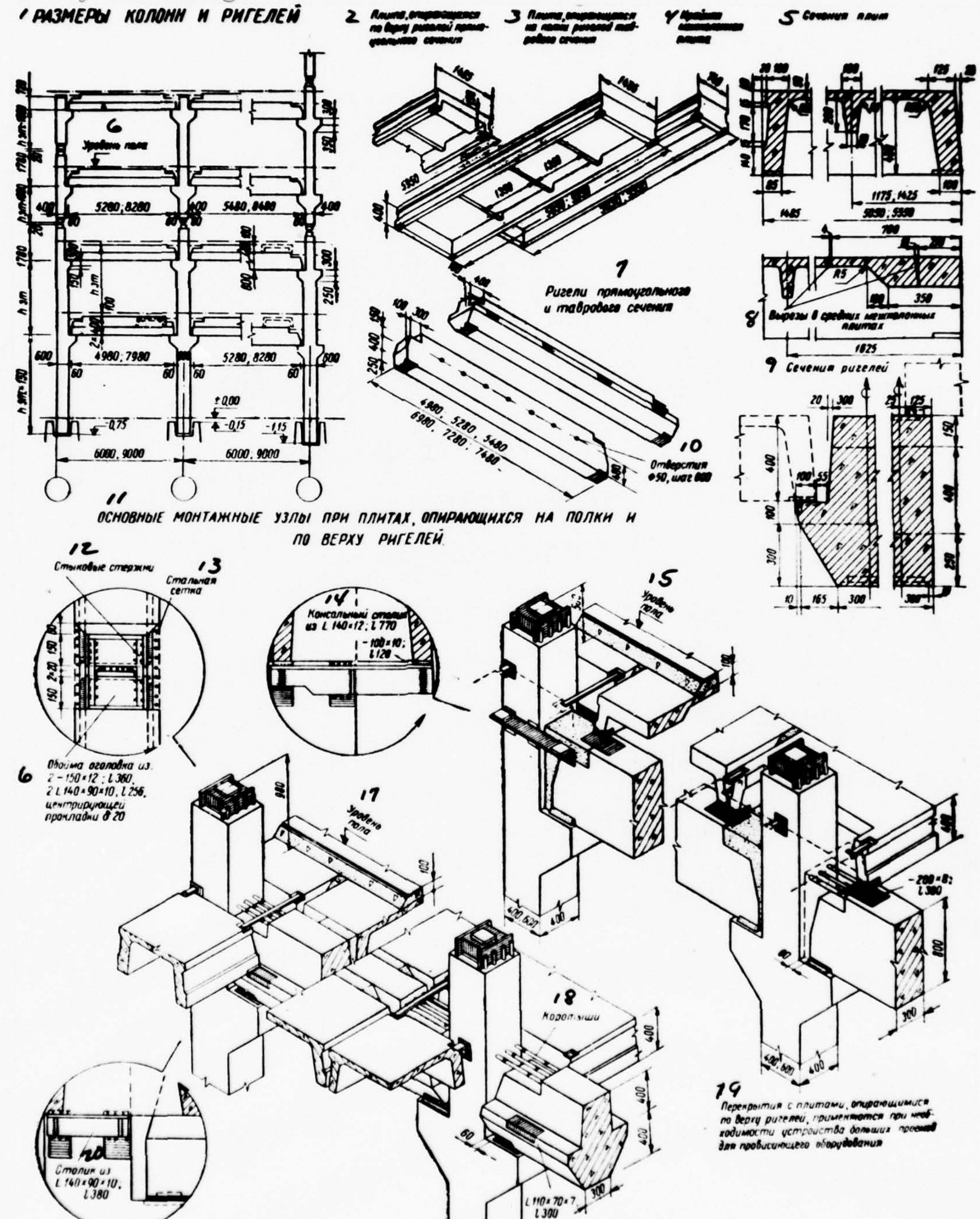
Sheet 15.

The multistory building from standardized cell/elements.



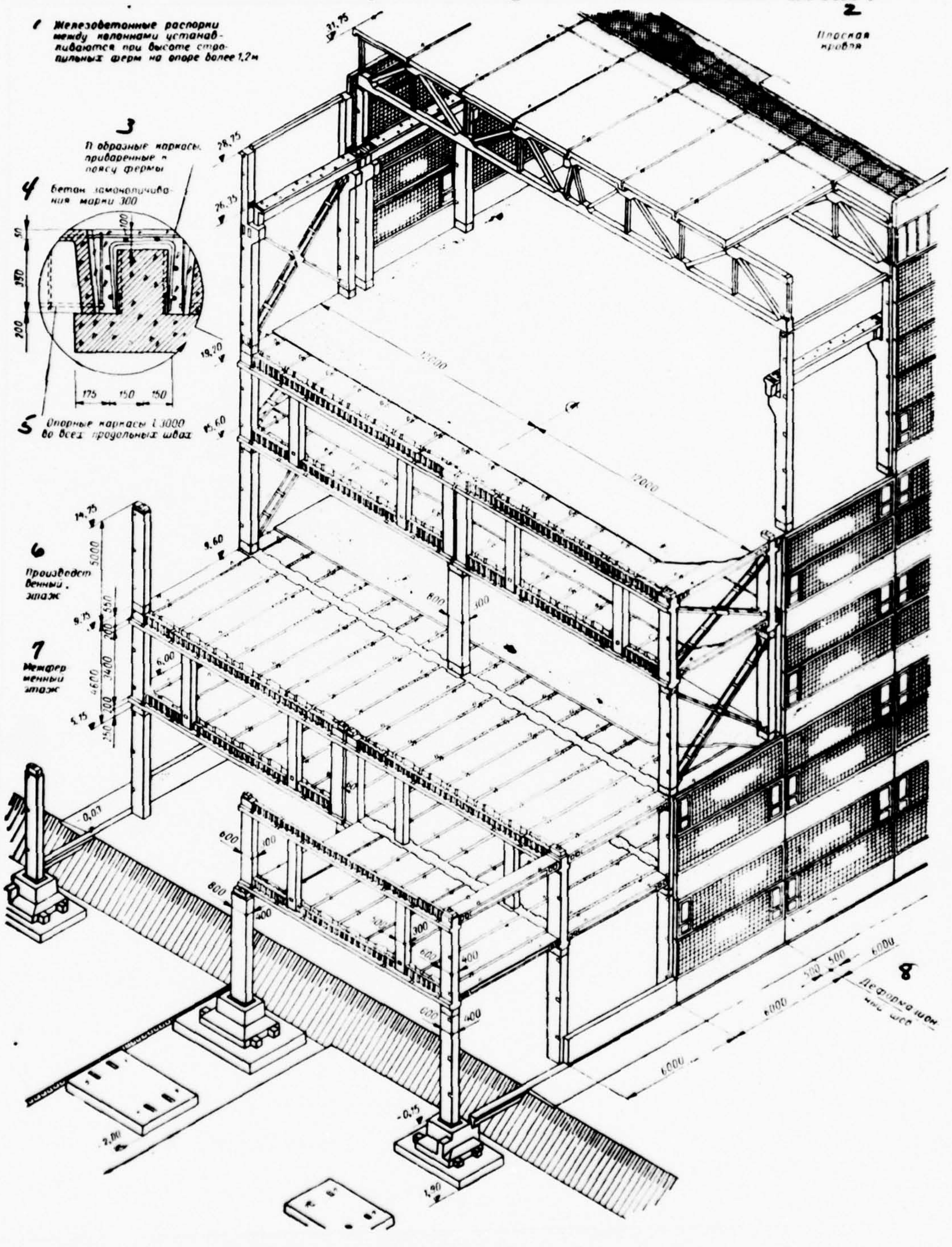
Key: 1 - parameters of standardized circuits. 2 - grid of columns, m. 3 - payload, ... 4 - tc. 5 - number of decks. 6 - number of flight/spans. 7 - height of decks, m. 8 - additional height of first deck, m. 9 - additional height of upper level, m. 10 - crane equipment of the increased upper level with the grid of columns .... 11 - suspension is single-beam tap/crane by load capacity to .... 12 - bridge crane by load capacity .... 13 - water intake. 14 - trapeziform panel of end-type parapet. 15 - height of lower floor is calculated from sex/floor to sex/floor; upper - from sex/floor to the bottom of the constructions of coating. 16 - connected columns. 17 - vertical communication/connections.

Sheet 16. Standardized cell/elements and the assembling units of the composite reinforced-concrete framework/body of the multi-story buildings.



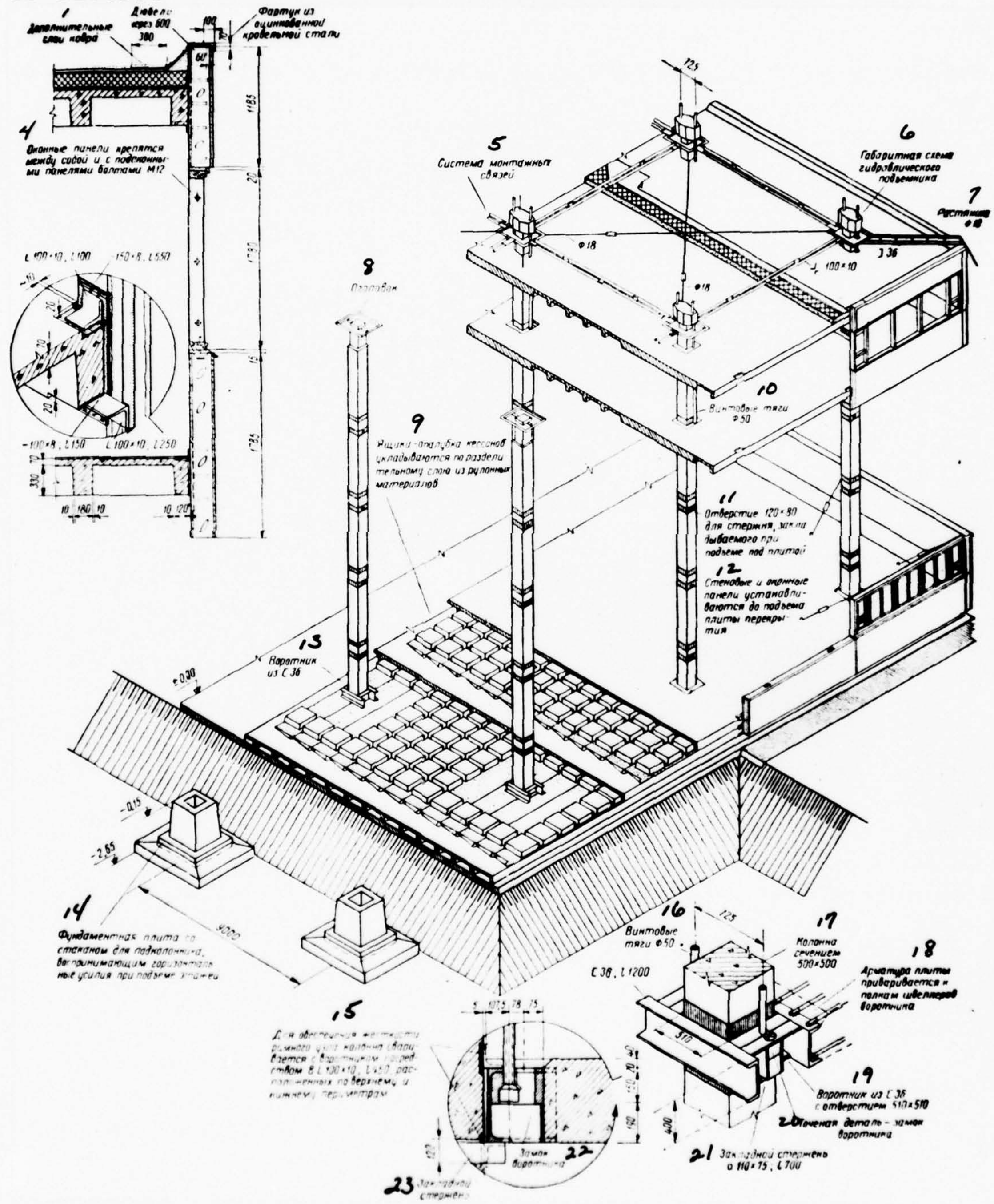
Key: 1 - size/dimensions of columns and cross bars. 2 - plate/slab, which rests on the top of the cross bars of rectangular cross section. 3 - plate/slab, which rests on the flanges of the cross bars of t-beamed section/cut. 4 - extreme intercolumn plate/slab. 5 - section/cuts of plate/slabs. 6 - floor level. 7 - cross bars of rectangular and t-beamed section/cut. 8 - grooves in the neutral intercolumn plate/slabs. 9 - section/cuts of cross bars. 10 - holes ... step/pitch ..... 11 - basic assembling units with the plate/slabs, which rest on flanges and on the top of cross bars. 12 - butting rods. 13 - steel mesh. 14 - cantilever stand from .... 15 - floor level. 16 - ring of end from ... the centering packing .... 17 - floor level. 18 - bolsters. 19 - overlaps with the plate/slabs, which rest on the top of cross bars, they are applied if necessary for the device of large apertures for the taking up the sag equipment. 20 - stand from ....

Sheet 17. The multistory building with intertruss decks.



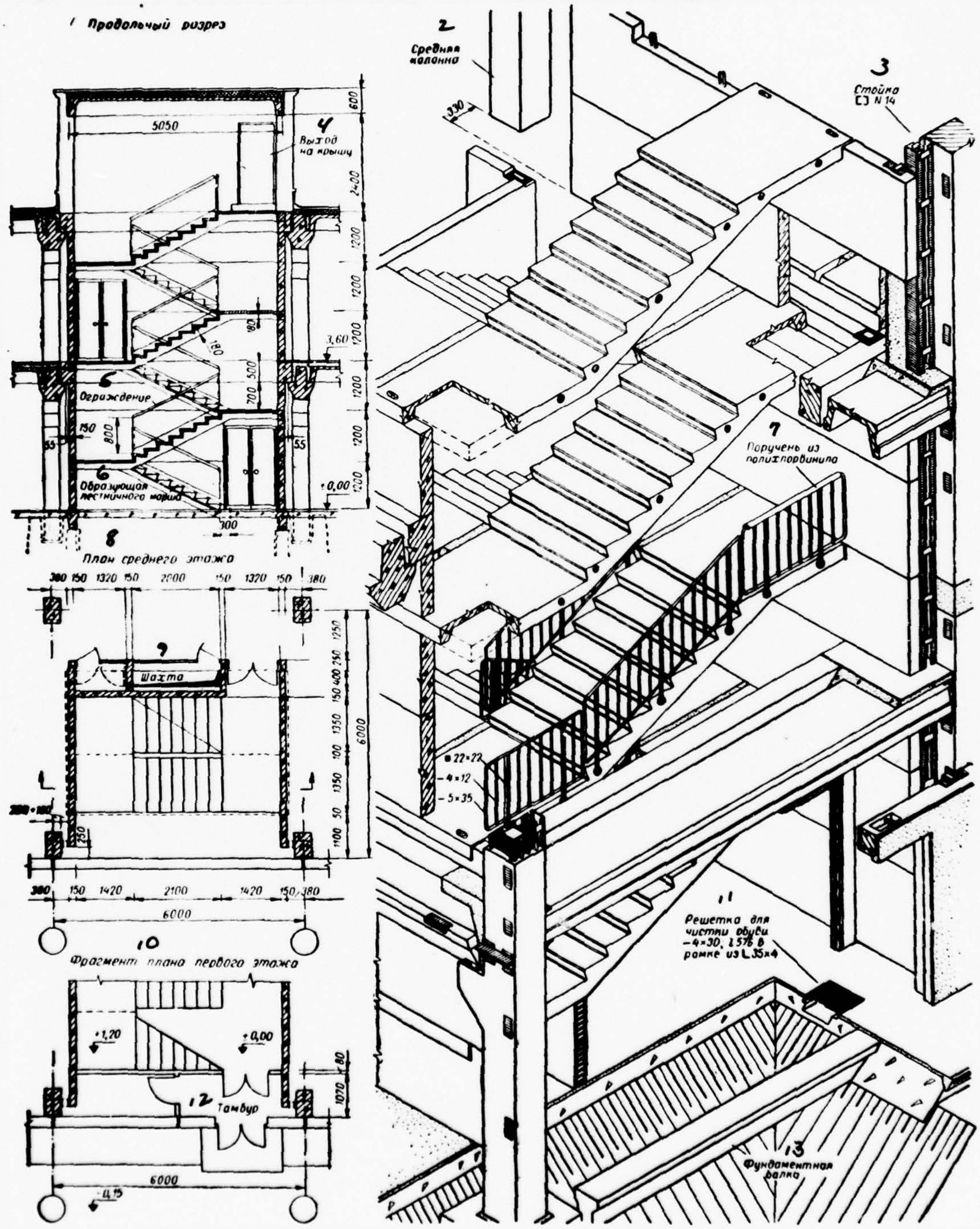
Key: 1 - reinforced-concrete spacers between columns are establish/installed at the height of the trusses on support more .... 2 - flat/plane roofing. 3 - U-shaped framework/bodies, welded and to flange. 4 - concrete of the monolithization of brand 300. 5 - supporting framework/bodies ... in all longitudinal seams. 6 - production deck. 7 - intertruss deck. 8 - deformation weld.

Sheet 18. The multistory building, raised by the method of lift of floors.



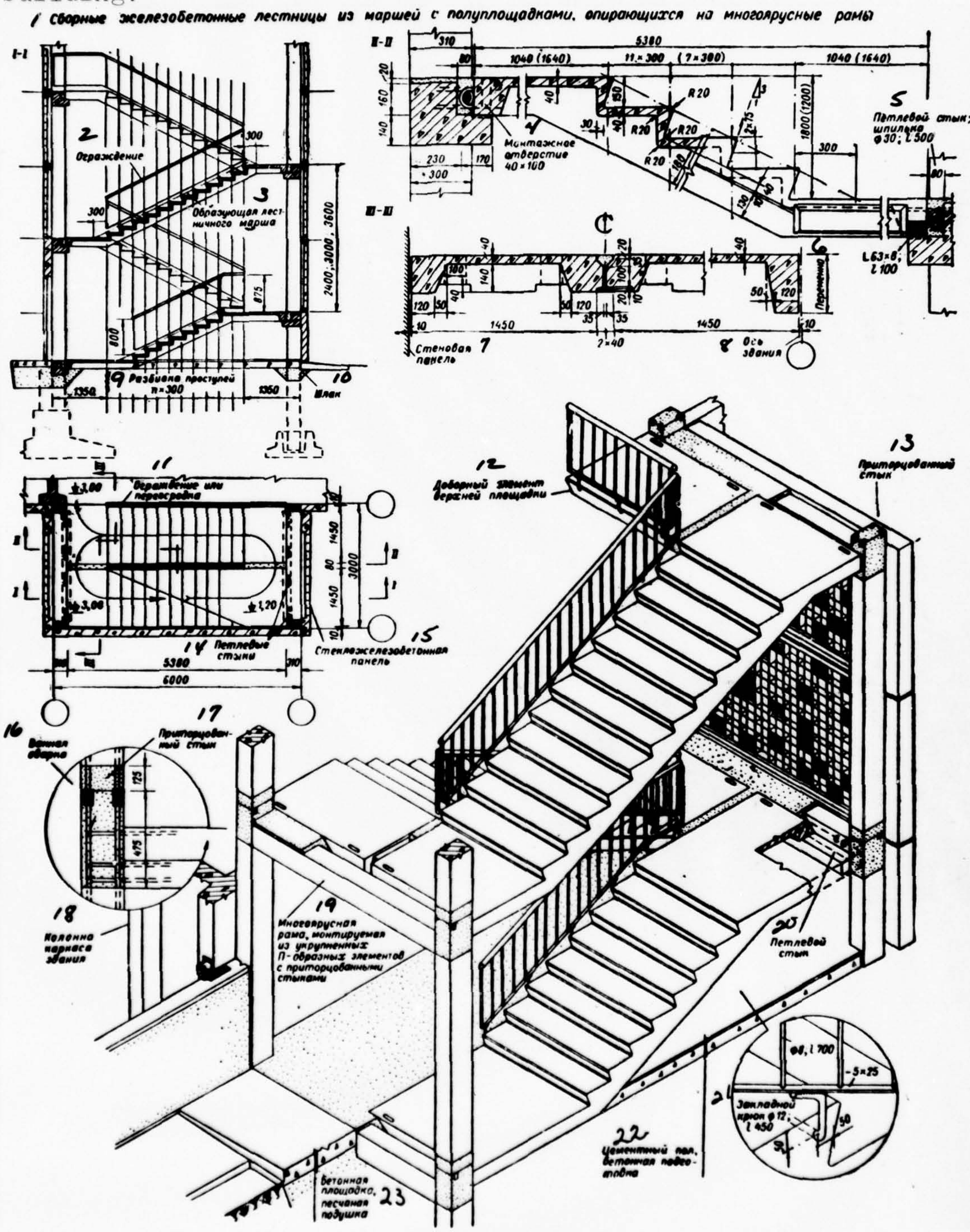
Key: 1 - additional layers of carpet. 2 - dowels through .... 3 - apron made of the zinc-coated roofing steel. 4 - window panels they are fastened between themselves and with window-sill panels by bolts .... 5 - system of assembling communication/connections. 6 - overall diagram of hydraulic hoist. 7 - brace .... 8 - end. 9 box- planking of caissons are packed on separating layer from roll materials. 10 - propeller thrust .... 11 - hole ... for the rod, laid during lift under plate/slab. 12 - wall and window panels they are establish/installed before the lift of the plate/slab of overlap. 13 - collar from .... 14 - base plate with the beaker/sleeve for a base, receiving horizontal effort/forces during the lift of decks. 15 - for providing the rigidity of frame assembly column is welded with collar by means of ... those arrange/located on upper and lower perimeters. 16 - propeller thrust ..... 17 - column by section/cut ..... 18 - the reinforcement of plate/slab it is welded to the flanges of the channel bars of collar. 19 - collar from ... with hole .... 20 - exact part - lock of collar. 21 - laying rod .... 22 - lock of collar. 23 - laying rod.

Sheet 19. Stair block, built-in into building.



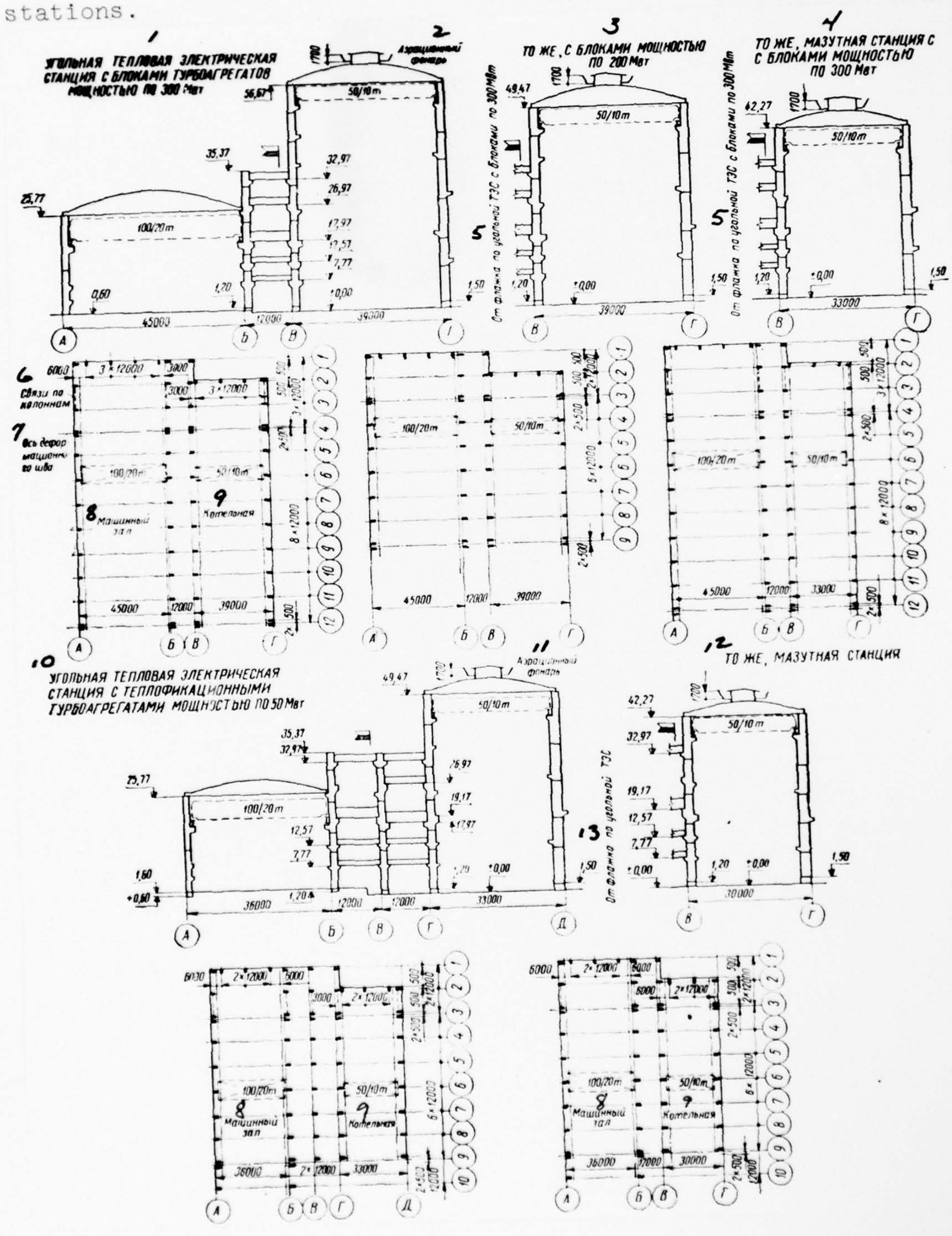
Key: 1 - longitudinal section. 2 - is average/mean column. 3 - strut .... 4 - output/yield to roof. 5 - enclosure/protection. 6 - forming of stairs march. 7 - handle from polyvinyl chloride. 8 - plan/layout of the middle story. 9 - shaft/mine. 10 - fragment of the plan/layout of the first deck. 11 - grate for cleaning of foot-wear ... to the framework from .... 12 - reel. 13 - foundation beam.

Sheet 20. Stair block, outlying for the outline/contour of the building.



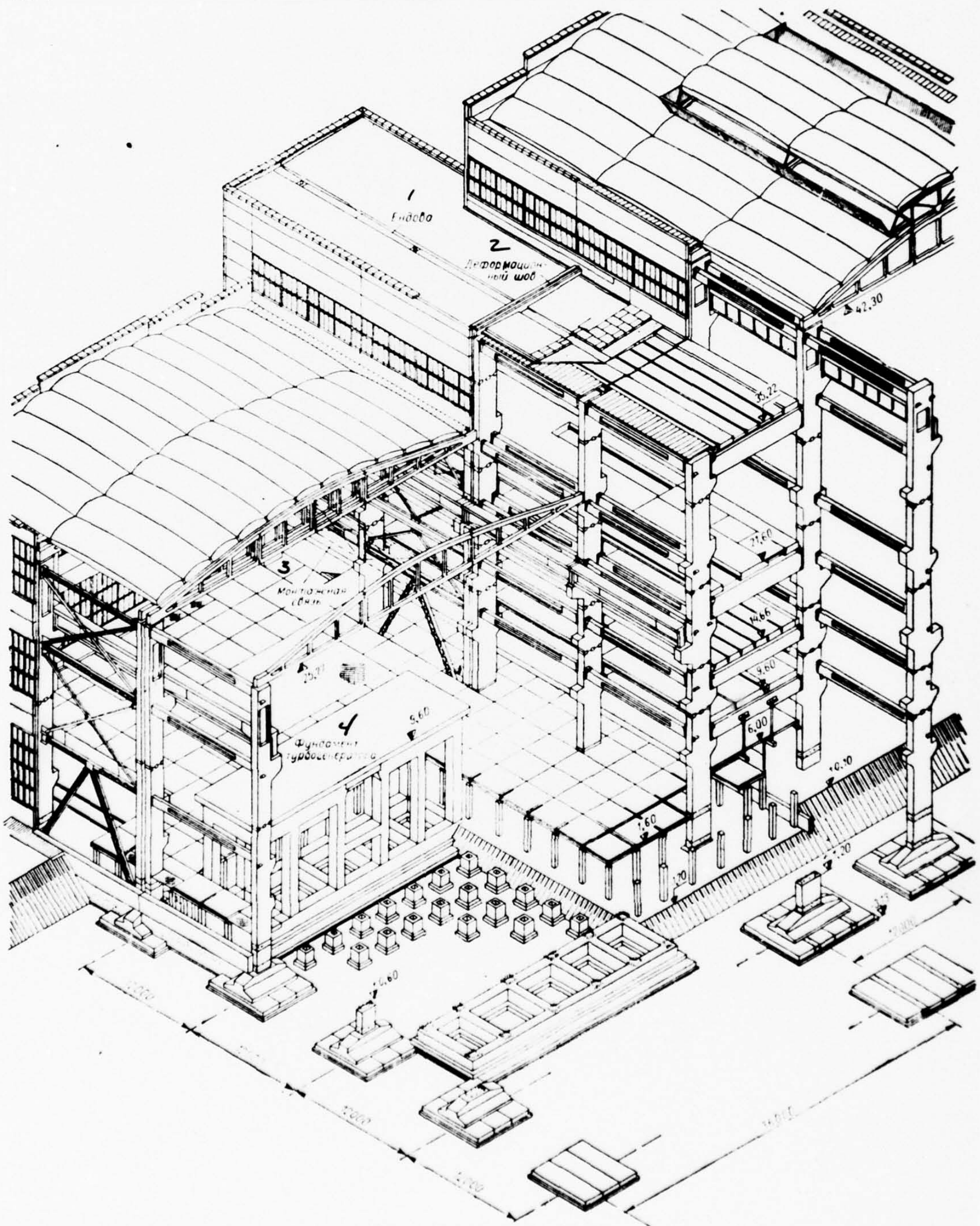
Key: 1 - composite reinforced-concrete staircases from the marchs with half-landings, which rest on multistage frames. 2 - enclosure/protection. 3 - forming of stairs march. 4 - open hole .... 5 - loop joint; pin .... 6 - it is alternate. 7 - wall panel. 8 - axle/axis of building. 9 - laying out of treads .... 10 - slag. 11 - enclosure/protection or partition. 12 - final assembly cell/element of upper area/site. 13 - fastened joint. 14 - loop joints. 15 - glass-reinforced concrete panel. 16 - tank welding. 17 - fastened joint. 18 - column of the framework/body of building. 19 - multistage frame, installed from the amalgamated U-shaped cell/elements with the fastened joints. 20 - loop joint. 21 - laying hanger ..... 22 - cement sex/floor, concrete preparation. 23 - concrete area/site, sand pillow.

Sheet 21. Diagrams of the main housings of heat and power stations.



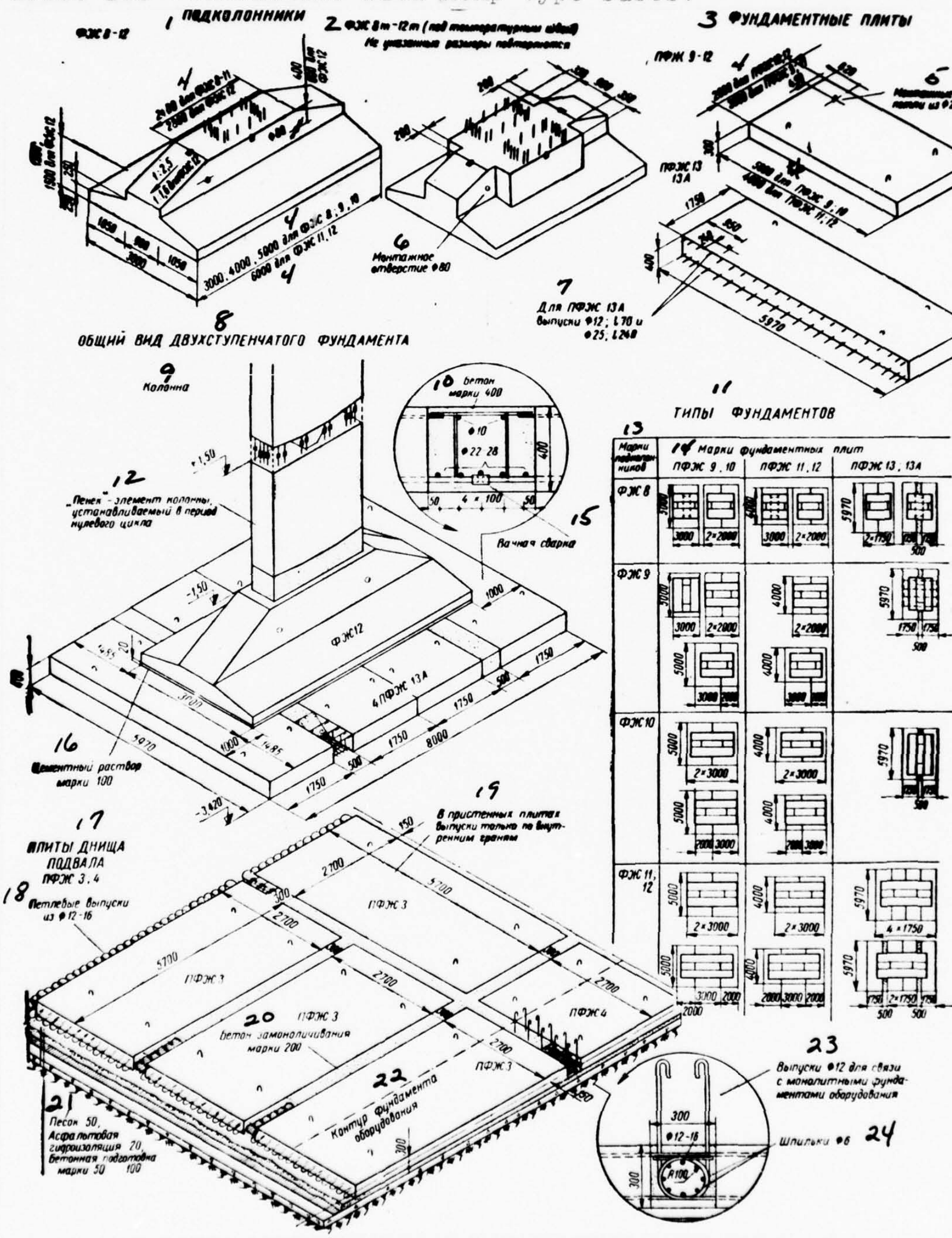
Key: 1 - coal thermal electrical station with blocks of turbine units 300 MW in power. 2 - aeration lamp/canopy. 3 - the same, with blocks 200 MW in power. 4 - the same, mazut station with blocks 300 MW in power. 5 - from flag on coal heat and power station with blocks on 300 MW. 6 - communication/connections on columns. 7 - axle/axis of deformation weld. 8 - machine room. 9 - it is boiler. 10 - coal thermal electrical station with the thermoficated turbine units with power 50 MW. 11 - aeration lamp/canopy. 12 - the same, mazut station. 13 - from flag on coal heat and power station.

Sheet 22. Main housing of gas-oil thermo-electric power station with the thermoficated turbine units with power 50 MW.



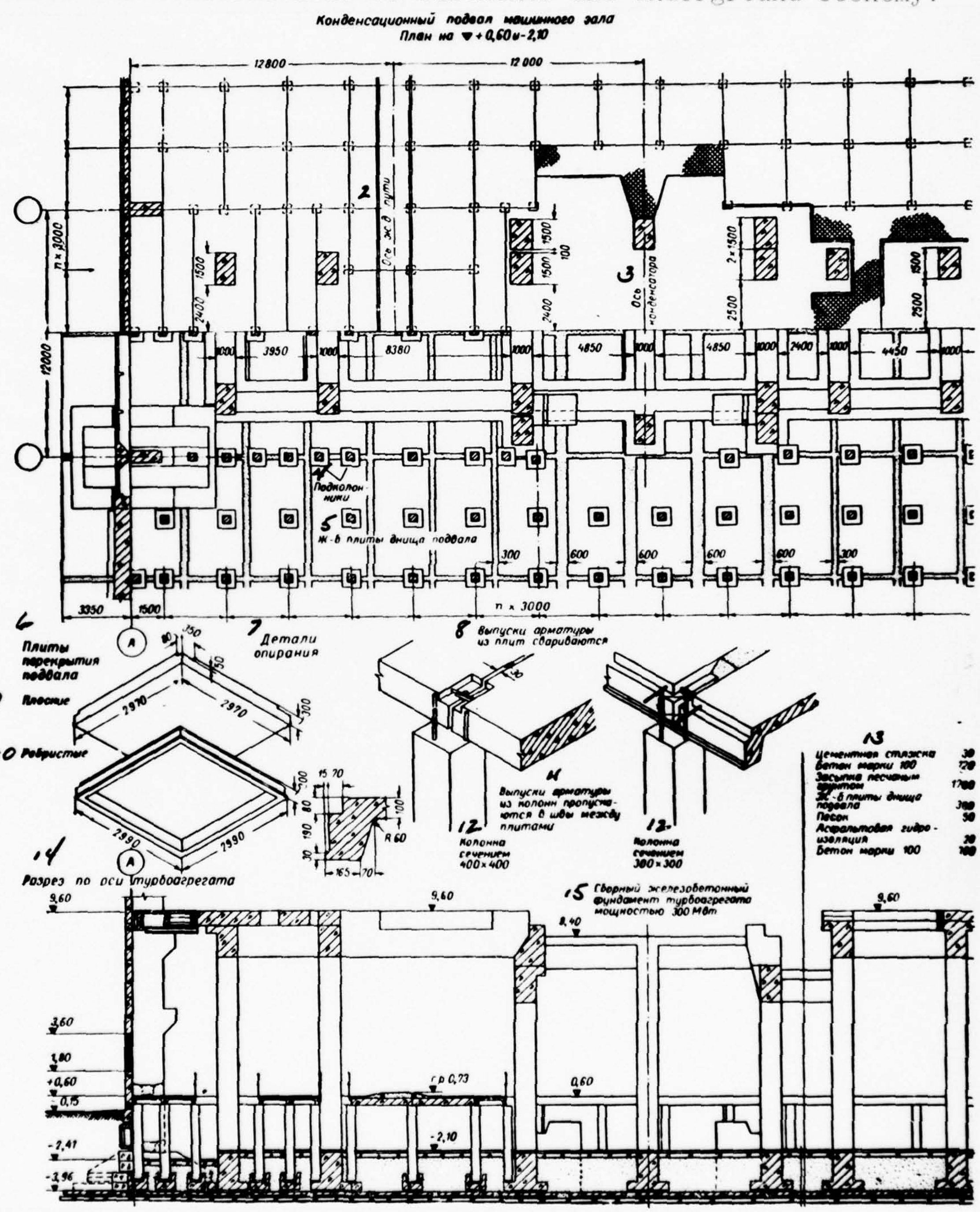
Key: 1 - valley. 2 - deformation weld. 3 - assembly communication/connection. 4 - foundation of turbogenerator.

Sheet 23. Foundations with hemp type bases.



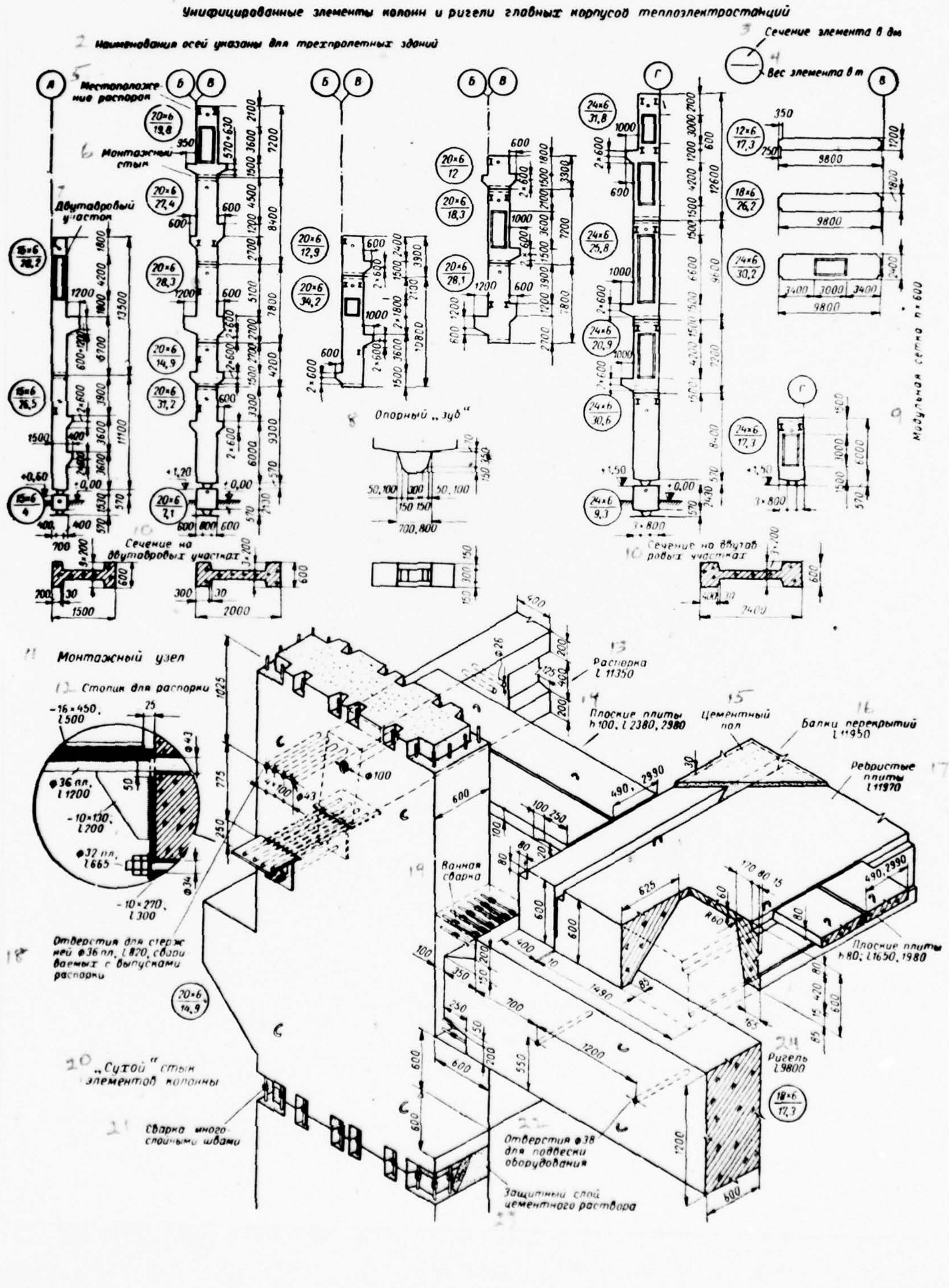
Key: 1 - bases. 2 - ... (under the expansion joint) the not indicated size/dimensions are repeated. 3 - base plates. 4 - ... for .... 5 Assembling loops from .... 6 - open hole .... 7 - for ... deviations .... 8 - general view of two-stage foundation. 9 - column. 10 - concrete of mark/brand .... 11 - types of foundations. 12 - "stump" - the cell/element of column, installed in the period of zero cycle. 13 - mark/brands of bases. 14 - mark/brands of base plates. 15 - tank welding. 16 - cement mortar of mark/brand .... 17 - plate/slabs of the bottom of basement .... 18 - loop issues from .... 19 - in the plate/slabs near the wall issues only on internal faces. 20 - concrete of the monolithization of mark/brand .... 21 - sand ... asphalt waterproofing ... the concrete preparation of mark/brand ..... 22 - outline/contour of the foundation of equipment. 23 - issues ... for communication/connection with monolithic foundations of equipment. 24 - pins ....

Sheet 24. Constructions of basements and underground economy.



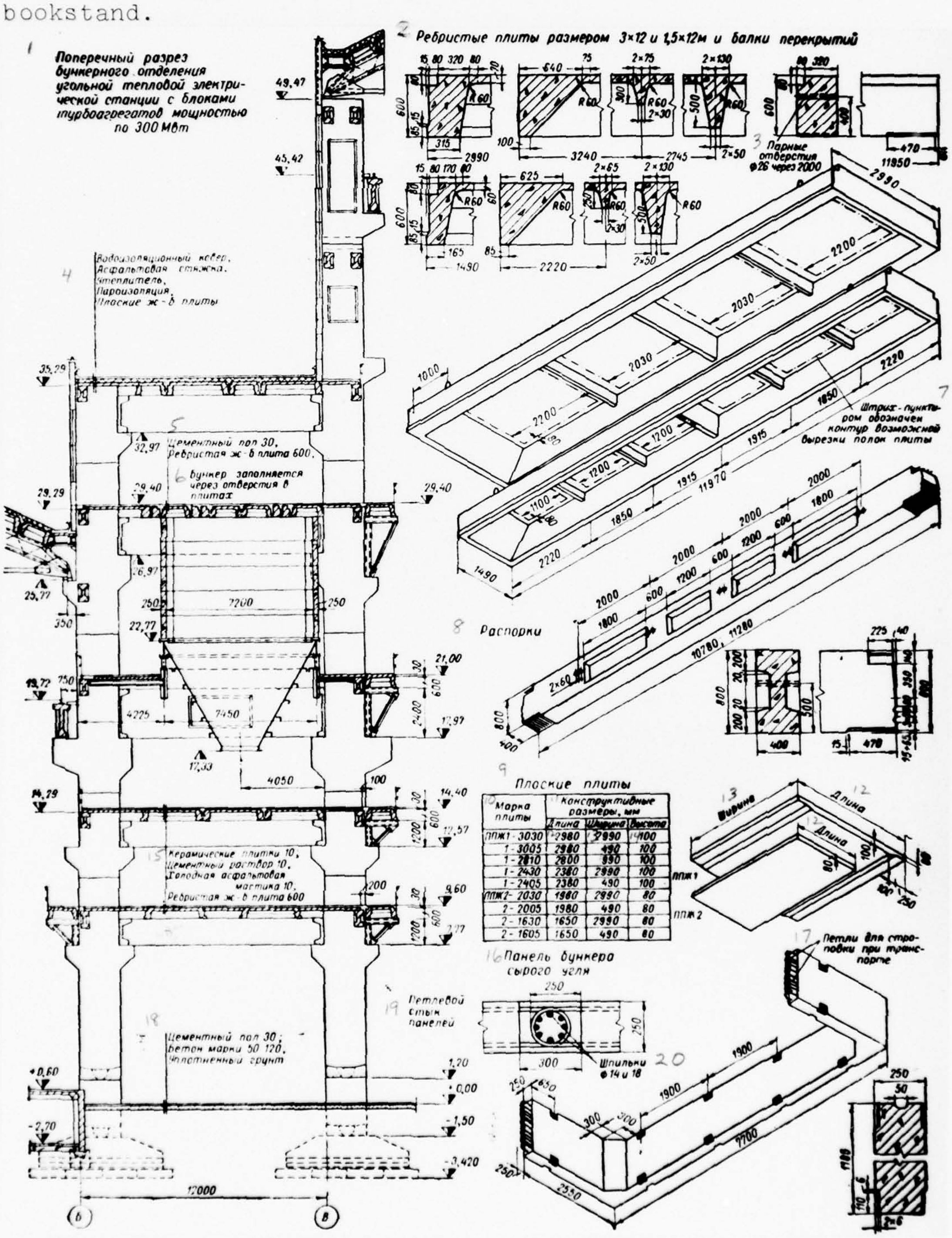
Key: 1 - condensation basement of machine room plan/layout on ... and .... 2 - axle/axis ... of way. 3 - condenser spindle. 4 - bases. 5 - reinforced concrete slab of bottom of basement. 6 - plate/slabs of the overlap of basement. 7 - parts of support. 8 - the issues of reinforcement from plate/slabs they are welded. 9 - flat/plane. 10 - finned. 11 - the issues of reinforcement from columns they are passed into the welds between plate/slabs. 12 - column by section/cut .... 13 - cement tie piece. Concrete of mark/brand .... Filling by sandy soil. ... the plate/slab of the bottom of basement. Sand. Asphalt waterproofing. Concrete of mark/brand .... 14 - cut/section along the axis of turbine unit. 15 - composite reinforced-concrete foundation of turbine unit by power ... MW.

Sheet 25. Standardized cell/elements of the framework/body of main housing.



Key: 1 - standardized cell/elements of columns and the cross bars of the main housings of thermo-electric powers station. 2 - the designations of axle/axes are shown for trispan buildings. 3 - section/cut of cell/element in dm. 4 - weight of cell/element m. 5 - location of spacers. 6 - field joint. 7 - double-T section. 8 - supporting "tooth". 9 - modular grid .... 10 - section/cut on double-T sections. 11 - assembling assembly. 12 - stand for a spacer. 13 - spacer .... 14 - flat/plane plate/slabs .... 15 - cement sex/floor. 16 - floor beams .... 17 - ribbed slabs ...:. 18 - holes for rods ... weldable with the issues of spacer. 19 - tank welding. 20 - "dry" joint of the cell/elements of column. 21 - multilayer welding. 22 - holes ... for the suspension of equipment. 23 - protective layer of cement mortar. 24 - cross bar ....

Sheet 26. Standardized cell/elements of bunker-deaerating bookstand.

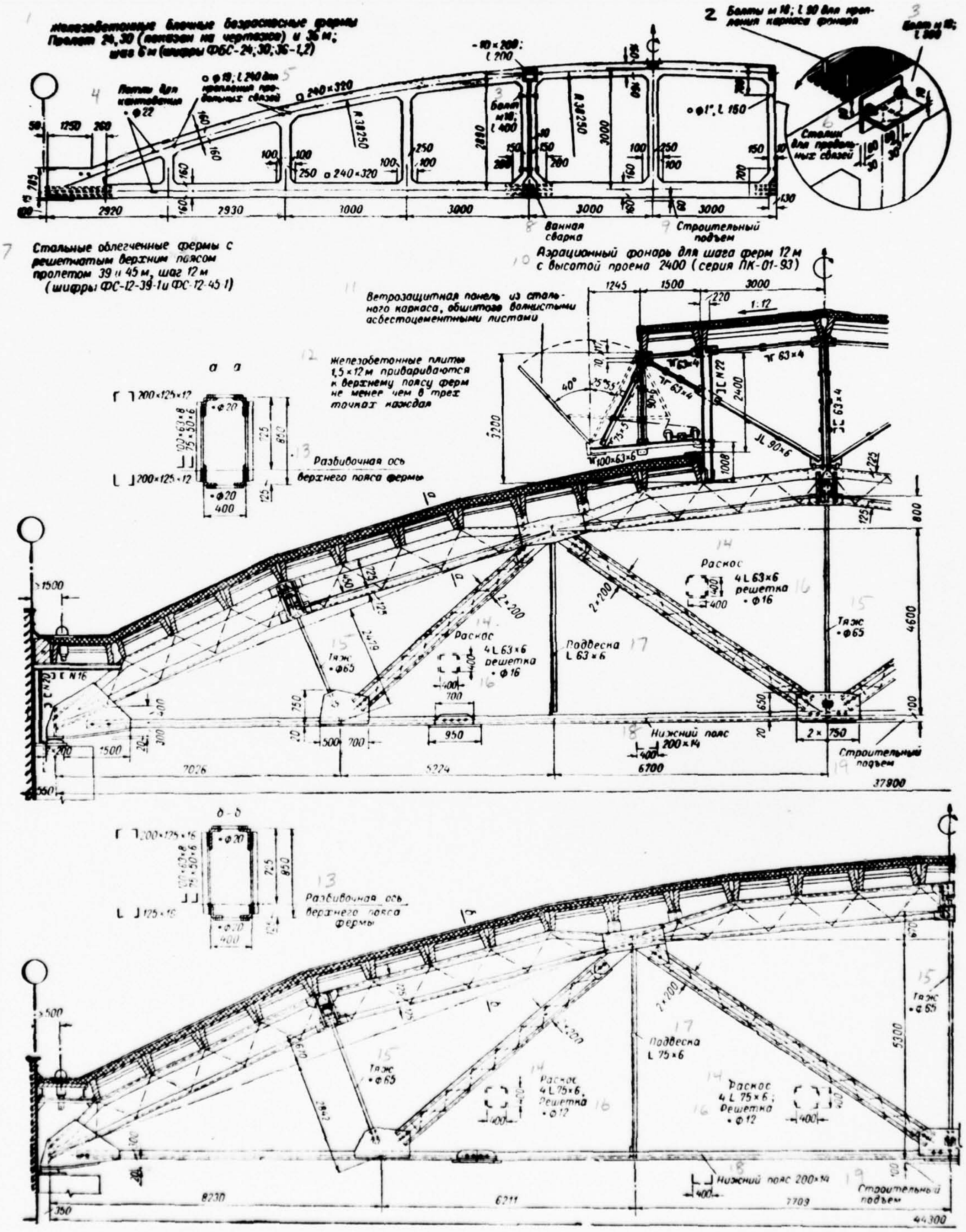


Плоские плиты

Марка плиты	Конструктивные размеры, мм		
	Длина	Ширина	Высота
ППЖ1-3030	2980	2990	100
1-3005	2980	490	100
1-2810	2800	990	100
1-2430	2380	2990	100
1-2405	2380	490	100
ППЖ2-2030	1980	2990	80
2-2005	1980	490	80
2-1630	1650	2990	80
2-1605	1650	490	80

Key: 1 - the cross section of bunker department/separation of carbon thermal electrical station with the blocks of turbine units by power on ... MW. 2 - ribbed slabs by size/dimension ... and ... and floor beam. 3 - conjugate holes ... through .... 4 - water-insulating carpet, asphalt tie piece, heater, steam insulation, flat/plane ... plate/slabs. 5 - cement sex/floor 30, finned ... plate/slab .... 6 - hopper is filled through hole in plate/slabs. 7 - dot-dash line designates outline/contour possible of the cut of the flanges of plate/slab. 8 - spacers. 9 - flat/plane plate/slabs. 10 - mark/brand of plate/slab. 11 - structural/design size/dimensions, mm. 12 - length. 13 - width. 14 - height. 15 - ceramic slabs ...; cement mortar ..., cold mastic asphalt ...; finned ... plate/slab .... 16 - panel of raw coal bunker. 17 - loops for slinging with transport. 18 - cement sex/floor ...; concrete of mark/brand ...; the condensed soil. 19 - loop joint panels. 20 - pins.

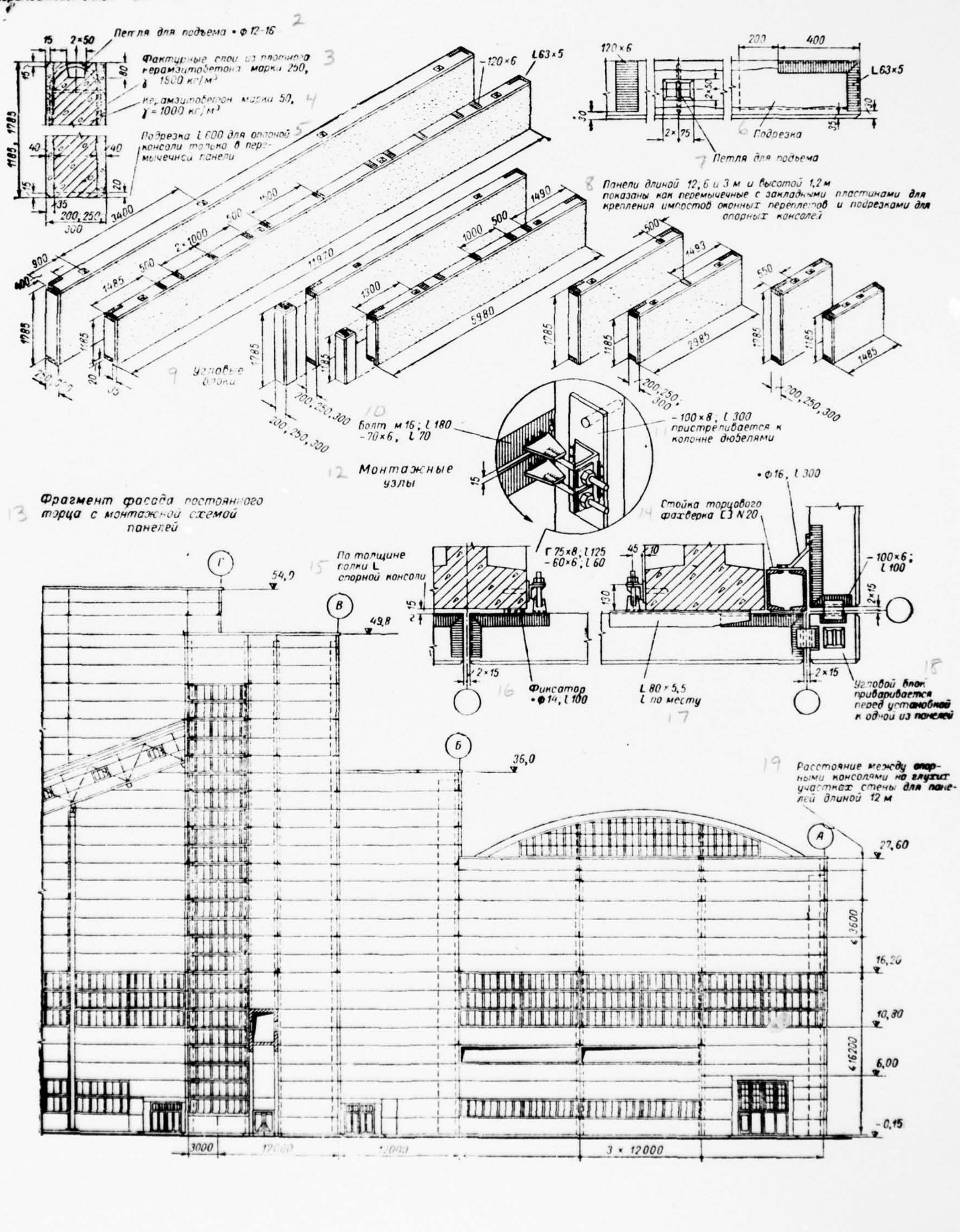
Sheet 27. Farm/trusses, used in the overlaps of main housings.



Key: 1 - reinforced-concrete block Vierendeel trusses flight/span ... (it is shown on drawing) and ...; step/pitch ... (numeral .... 2 - bolts ... for fastening of the framework/body of skylight. 3 - bolt .... 4 - loops for turning .... 5 - ... for fastening longitudinal communication/connections 6 - stand for longitudinal communication/connections. 7 - steel lightened farm/trusses with grate upper belt/zone by flight/span ... and ... step/pitch ... (ciphers .... 8 - tank welding. 9 - construction lift. 10 - aeration lamp/canopy for the step/pitch of farm/trusses ... with the height of aperture ... (series .... 11 - windshield panel from the steel framework/body, sheathed by corrugated asbestos cement sheets. 12 - reinforced-concrete plate/slabs ... they are welded to upper flange not less than at three points each. 13 - center line of upper flange. 14 - strut .... 15 - belt .... 16 - grate .... 17 - suspension .... 18 - lower belt/zone .... 19 - construction lift.

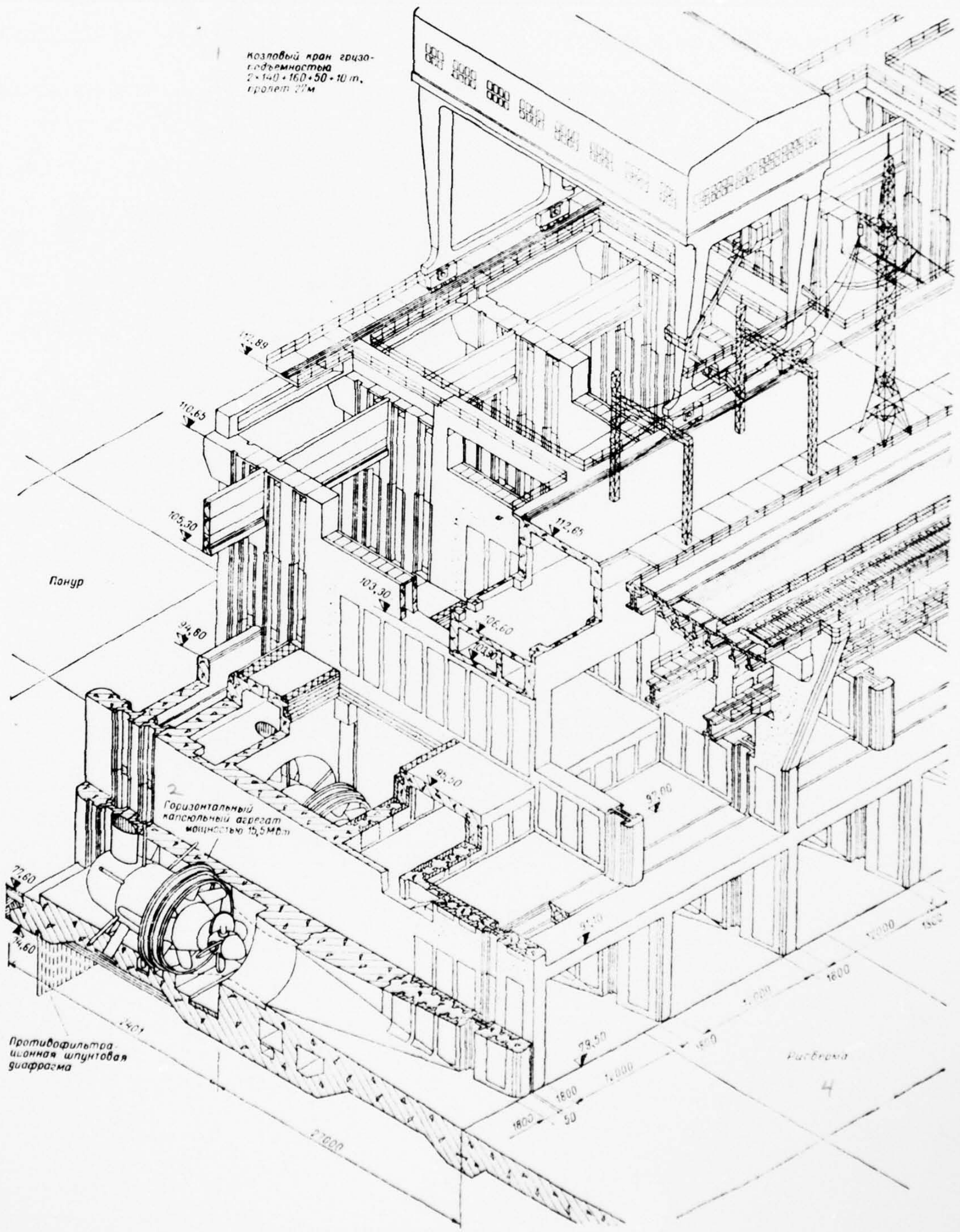
Sheet 28. Wall panels.

Керамзитобетонные стеновые панели, применяемые в зданиях теплоэлектростанций при шаге колонн 12 м



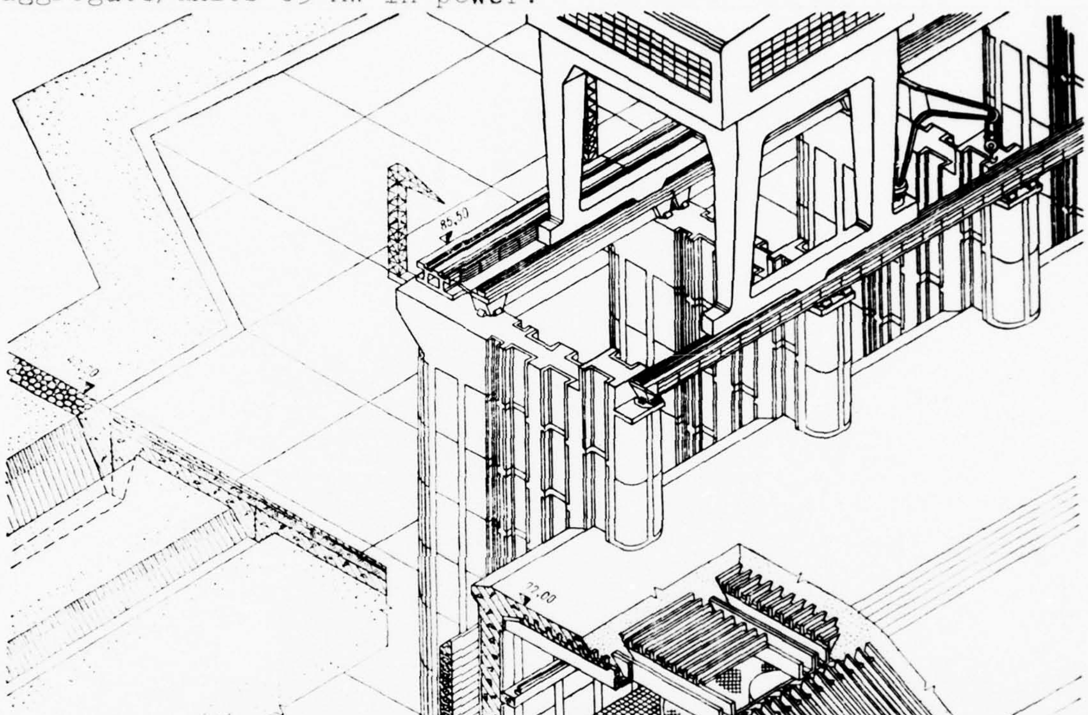
Key: 1 - claydite-concrete wall panels, used in the buildings of thermo-electric powers station with the step/pitch of columns .... 2 - loop for lift .... 3 - facing layers from dense keramzit concrete of mark/brand .... 4 - keramzit concrete of mark/brand ... kg/m³. 5 notch ... for the bearing bracket only in connecting panel. 6 - trimming. 7 - loop for lift. 8 - panels by length ... and ... and by height ... are shown as connecting with laying plates for fastening of the imposts of the sashes and notches for the bearing brackets. 9 - angular blocks. 10 - bolt. 11 - ... are shot to column by dowels. 12 - assembling assemblies. 13 - fragment of the facade of constant end/face with the assembly diagram of panels. 14 - strut of end-type framework .... 15 - according to thickness the flanges ... of the bearing bracket. 16 - clamping fixture .... 17 -... on place. 18 - angular block it is welded before the installation to one of the panels. 19 - distance between supporting/reference brackets on the archaic sections of wall for panels by length ....

Sheet 29. Section of the building of riverbed combined low-pressure hydroelectric station with capsule aggregate/units 15 MW in power.



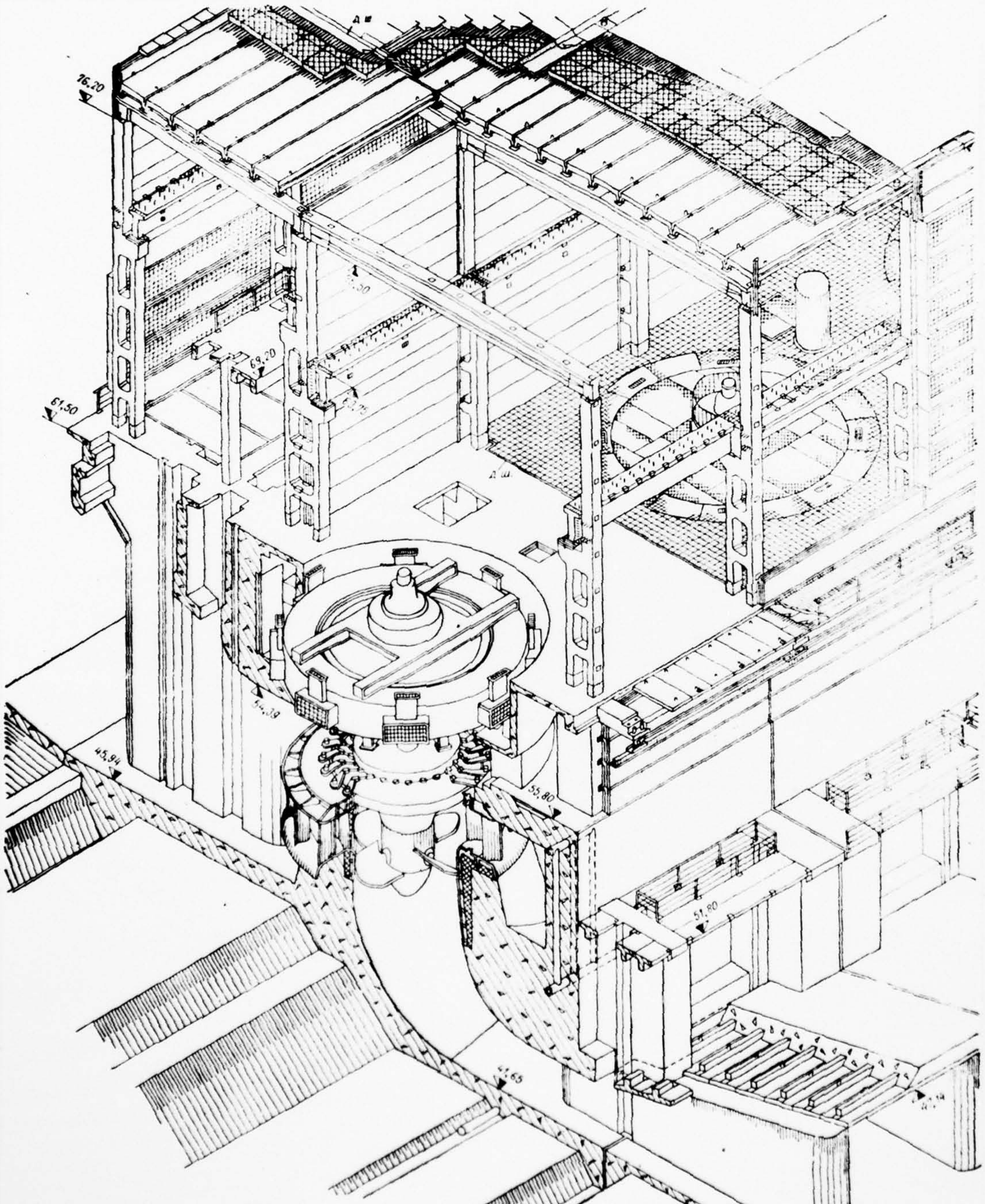
Key: 1 - the gantry crane by load capacity ... t, flight/span .... 2 - horizontal capsule aggregate/unit by power ... MW. 3 - antifiltration groovy diaphragm. 4 - apron.

Sheet 30. Section of the building of the riverbed combined hydroelectric power plant of medium pressure head with aggregate/units 85 MW in power.

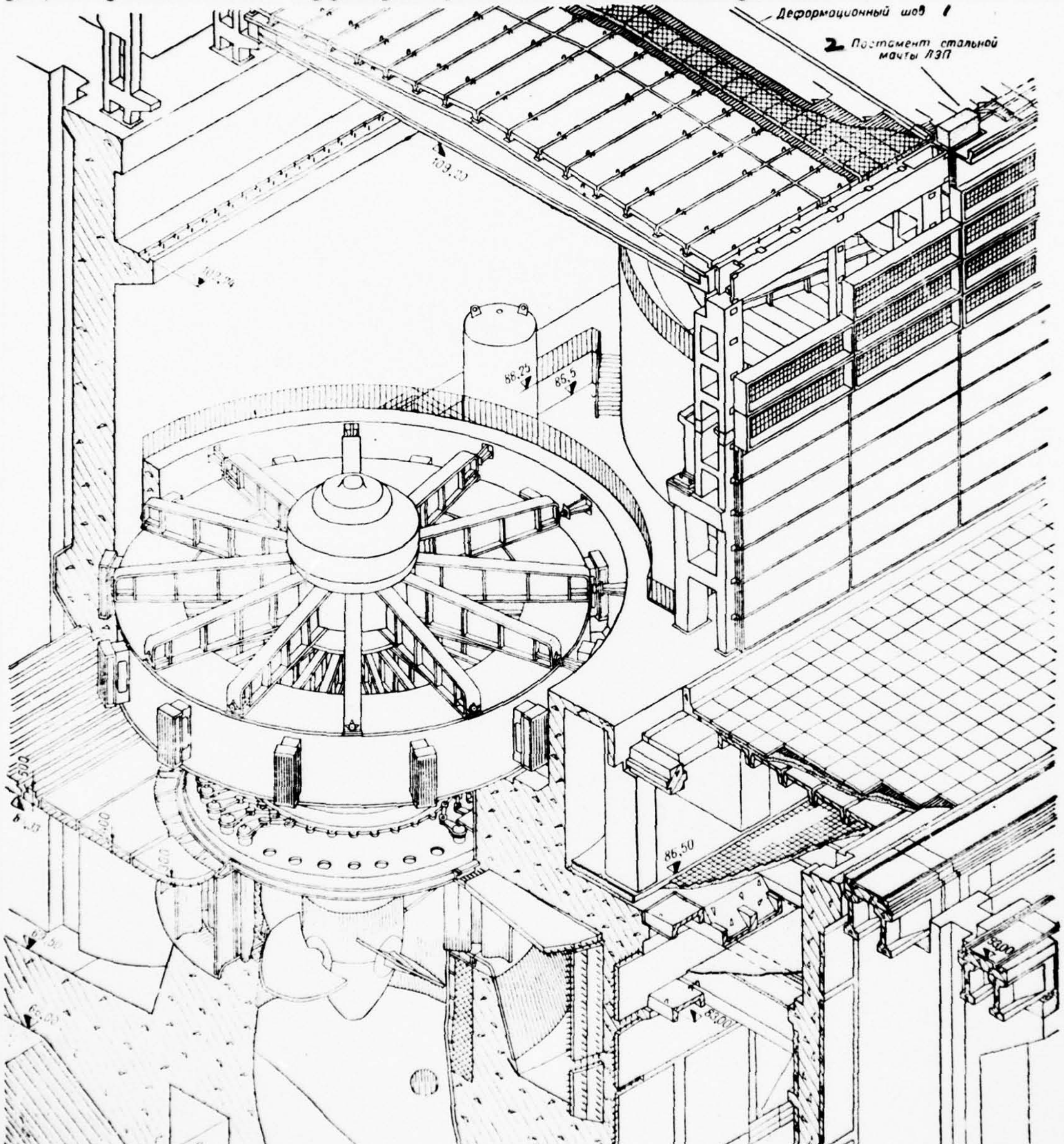


Page 84.

Sheet 31. Aggregate block of riverbed low-pressure hydroelectric power plant with aggregate/units 10 MW in power.

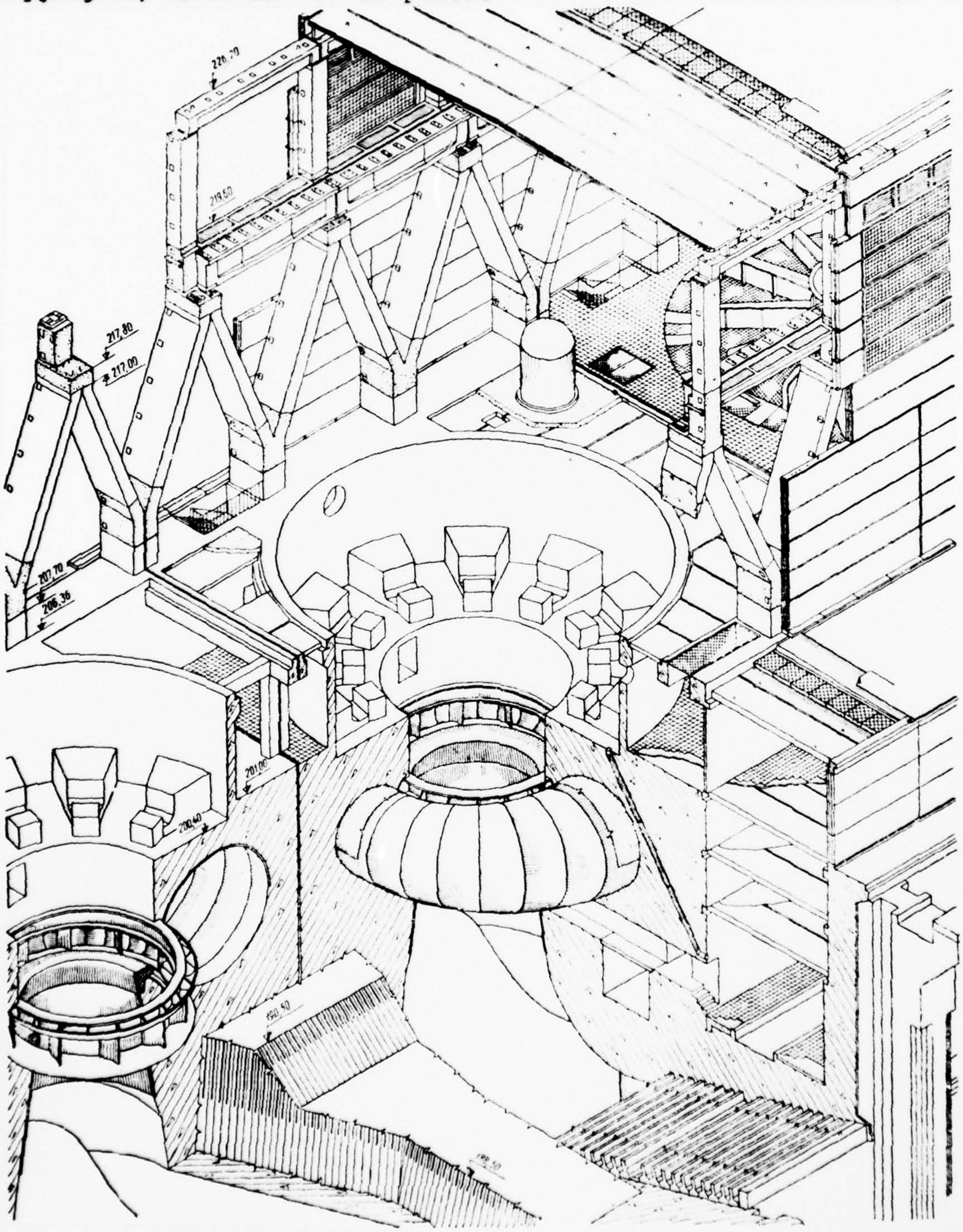


Sheet 32. Aggregate block of riverbed low-pressure hydroelectric power plant with aggregate/units 100 MW in power.

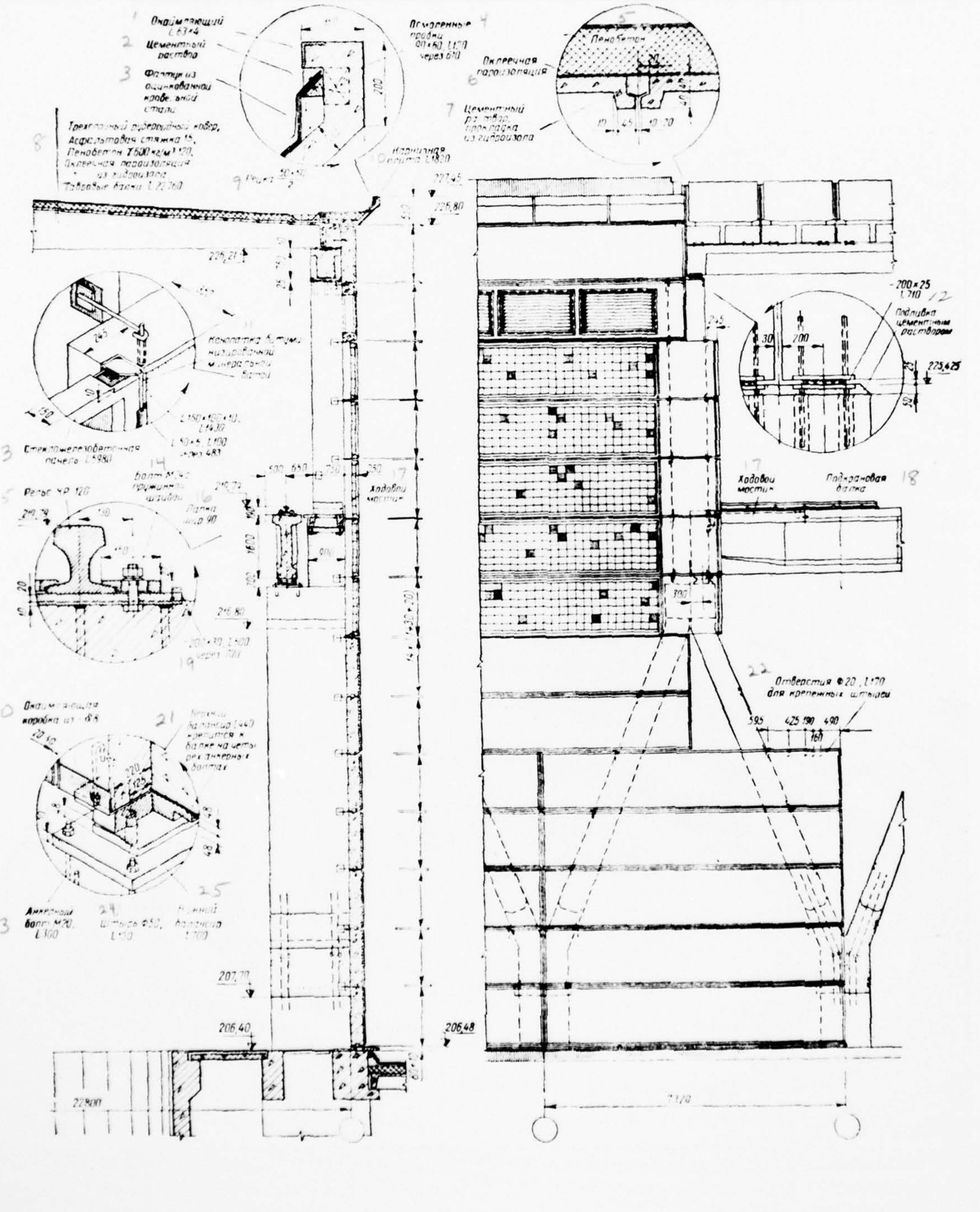


Key: 1 - deformaticn weld. 2 - pedestal of the steel mast LEP.

Sheet 33. Aggregate block of near-dam hydroelectric power plant with aggregate/units 225 MW in power.

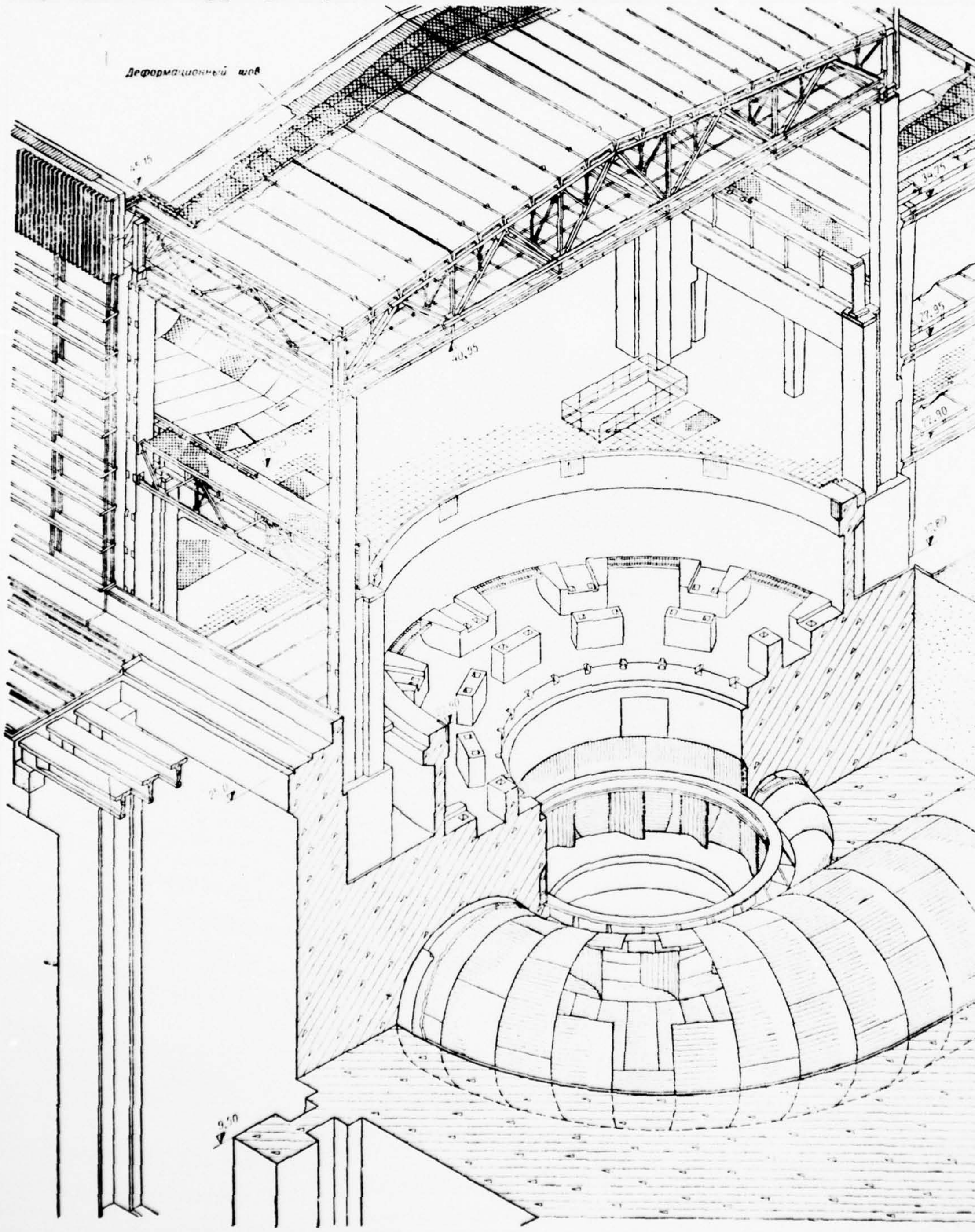


Sheet 34. Cell/elements and the assembling units of superstructure.



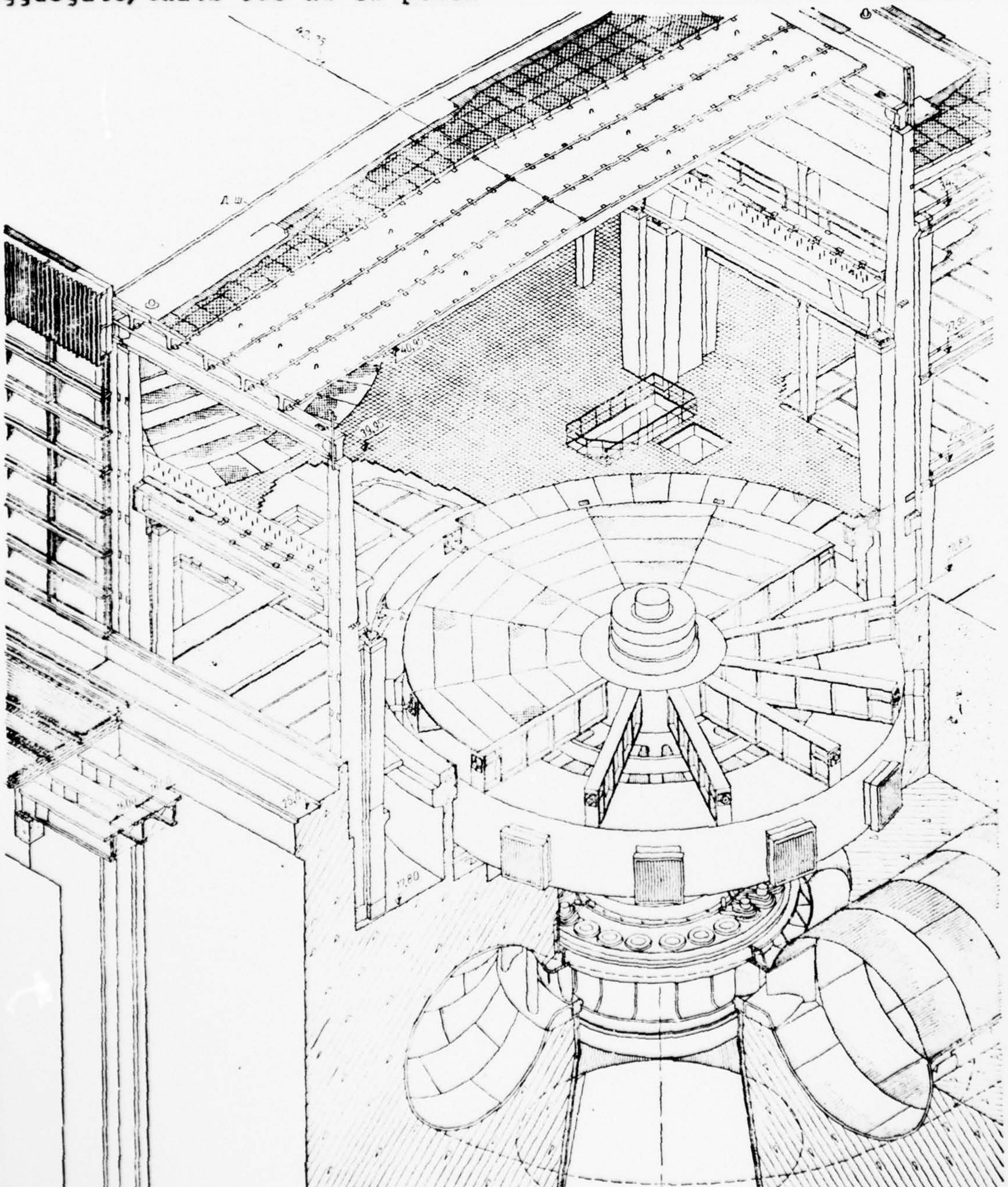
Key: 1 - bordering .... 2 - cement mortar. 3 - apron made of the zinc-coated roofing steel. 4 - resinift plugs ... through .... 5 - cellular concrete. 6 - backing steam insulation. 7 - cement mortar, packing from hydroisol. 8 - three-layered rubercid carpet, asphalt tie piece ... cellular concrete ... kg/m³ ..., is backing steam insulation from hydroisol. T-beams .... 9 - rack. 10 - cornice plate/slab ..... 11 - chisel by the bituminized slag cotton. 12 - dressing by cement mortar. 13 - glass-reinforced-concrete panel .... 14 - bolt ... with spring washer. 15 - rail .... 16 - clamp latitude .... 17 - pilot bridge. 18 - crane beam. 19 - ... through .... 20 - bordering box from .... 21 - seat ... it is fastened to beam to four anchor bolts. 22 - holes ... for fastening pins. 23 - anchor bolt .... 24 - pin .... 25 - chair ....

Sheet 35. Aggregate block of near-dam hydrcelectric power plant with the removed aggregate/unit 500 MW in power.

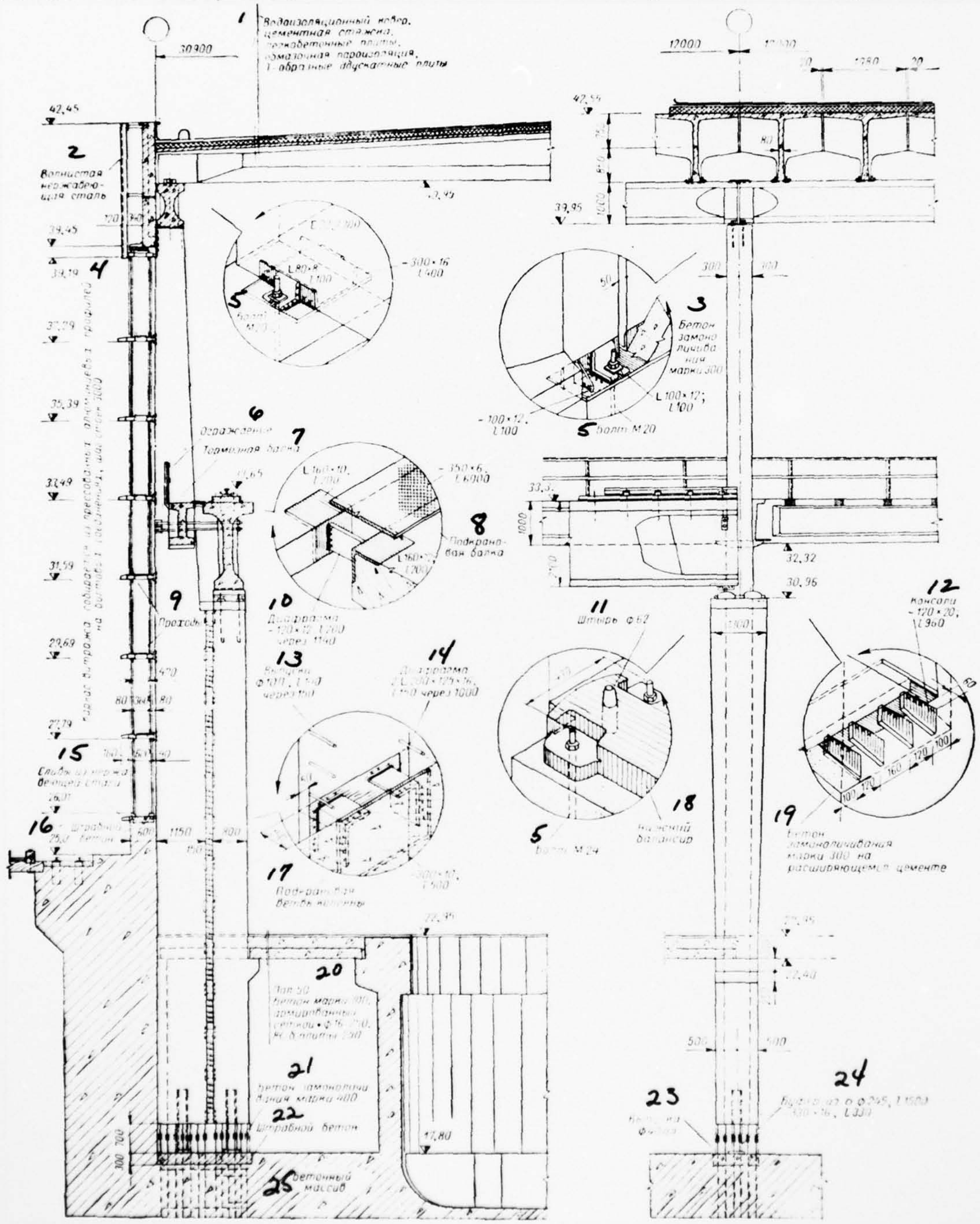


Key: 1 - deformation weld.

Sheet 36. Aggregate blcck of near-cam hydrcelectric power plant with aggregate/units 500 MW in pcwer

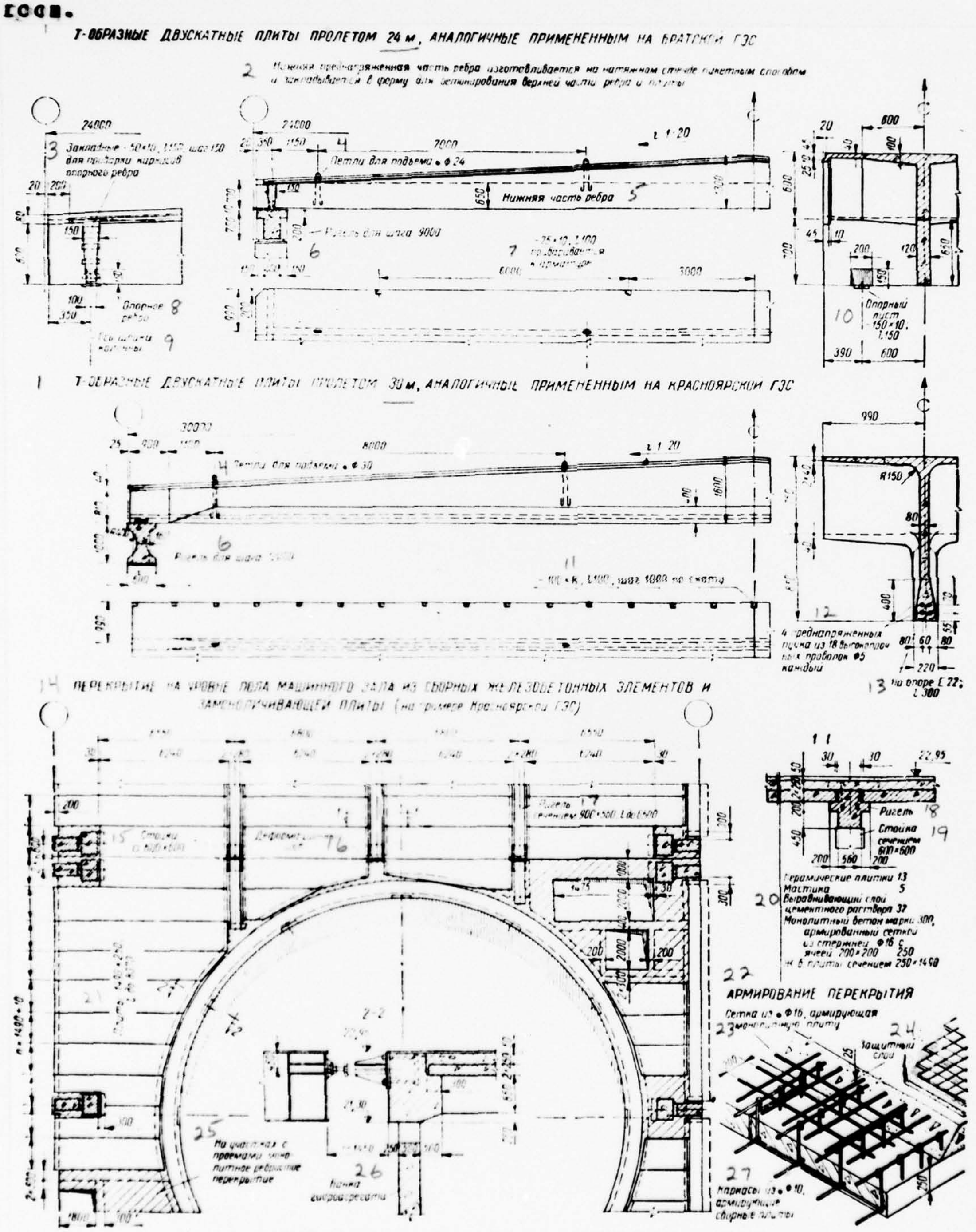


Sheet 37. Cell/elements and the assembling units of superstructure.



Key: 1 - water-insulating carpet, cement tie piece, light-concrete plate/slabs, coating steam insulation, t-shaped two-slope surface plate/slabs. 2 - corrugated stainless steel. 3 - concrete of the monolithization of mark/brand .... 4 - the framework/body of stained-glass panel is assembled from the pressed aluminum airfoil/profiles during bolted joints, the step/pitch of struts .... 5 - enclosure/protection. 7 - braking beam. 8 - crane beam. 9 - passes. 10 - diaphragm ... through .... 11 - pin .... 12 - arms .... 13 - issues ... through .... 14 - diaphragm ... through .... 15 - drains made of the stainless steel .... 16 - toothing concrete. 17 - crane branch of column. 18 - chair. 19 - concrete of the monolithization of mark/brand ... on expanding cement. 20. Sex/floor ... concrete of mark/brand ... reinforced by grid ... reinforced-concrete plate/slabs .... 21 - concrete of the monolithization of mark/brand .... 22 - toothing concrete. 23 - issues ... pl. 24 - buffer from .... 25 - concrete array.

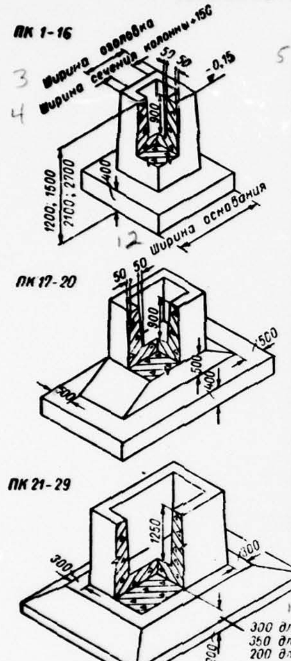
Sheet 38. Cell/elements cf the cverlap and cf the coating of machine rcom.



Key: 1 - t-shaped two-slope surface plate/slabs by flight/span ... m, analogous used on Bratsk HEP. 2 - the lower prestressed part of the fin/edge it is made on tightening bench by package method and is laid into form for the concreting of the upper part of the fin/edge and plate/slab. 3 - laying ... step/pitch ... for welding of the framework/bodies of fulcrum. 4 - loops for lift .... 5 - lower part of the fin/edge. 6 - cross bar for a step/pitch .... 7 - ... are welded to fittings. 8 - fulcrum. 9 - axle/axis of the neck of column. 10 - supporting/reference sheet .... 11 - ... step/pitch ... on slope, 12 - ... prestressed of beam of ... high-strength wires ... each. 13 - on support .... 14 - overlap at the level of the sex/floor of machine room from composite reinforced-concrete cell/elements and the assembling in one piece plate/slab (based on the example Krasnoyarsk HEP). 15 - struts .... 16 - deformation weld. 17 - cross bar by section/cut ... to .... 18 - cross bar. 19 - strut by section/cut .... 20 - ceramic slabs ... mastic ... the leveling layer of cement mortar ... monolithic concrete of the mark/brand ... reinforced of grid from rods ... with cells ... reinforced concrete plates by section/cut. 21 - plates ... to .... 22 - reinforcement of overlap. 23 - grid from ... reinforcing monolithic of plate/slab. 24 - protective layer. 25 - on sections with apertures monolithic finned overlap. 26 - hydroaggregate bank. 27 - framework/bodies from ... the reinforcing composite plate/slabs.

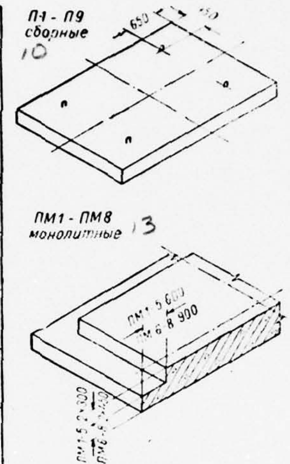
Sheet 39. Foundations with glass type bases.

1 Подколонники



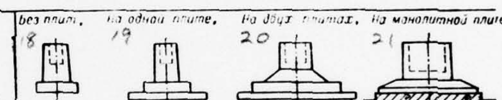
5 Сечения колонн, мм	6 Оголовок / 7 основание, мм	8 Марка подколонника / 9 объем бетона, м³ при высоте, мм 1200	1500	2100	2700
400×400	900×900 / 1500×1500	ПК-1 / 1,40	ПК-2 / 1,67	ПК-3 / 2,22	ПК-4 / 2,76
	900×900 / 1700×1700	ПК-5 / 1,66	ПК-6 / 1,93	ПК-7 / 2,48	ПК-8 / 3,02
	900×900 / 1900×1900	ПК-9 / 1,94	ПК-10 / 2,21	ПК-11 / 2,76	ПК-12 / 3,30
600×400 800×400 500×500	1300×1000 / 1900×1900	ПК-13 / 2,15	ПК-14 / 2,56	ПК-15 / 3,42	ПК-16 / 4,27
600×400 800×400 500×500 600×500 800×500	1300×1000 / 3700×2100	ПК-17 / 4,28	ПК-18 / 4,72	ПК-19 / 5,61	ПК-20 / 6,50
1000×400 1000×500	1600×1000 / 3300×2500		ПК-21 / 4,26	ПК-22 / 5,30	ПК-23 / 7,34
1300×500 1400×500 1400×600	2000×1200 / 4100×2900		ПК-24 / 6,30	ПК-25 / 7,82	ПК-26 / 9,62
1900×600	2500×1200 / 4100×2900		ПК-27 / 5,81	ПК-28 / 7,72	ПК-29 / 9,53

2 Фундаментные плиты



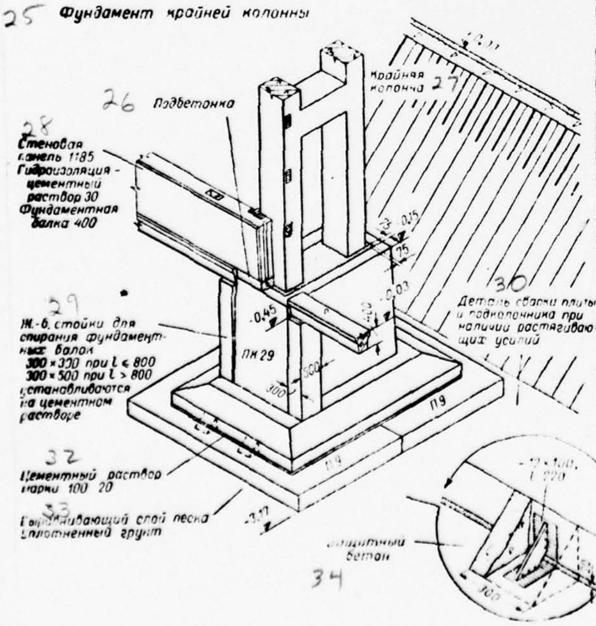
7 Основание, мм	11 Марка плиты / 9 объем бетона, м³ при высоте, мм 300	400	600	900
1900×2500	П1 / 1,43		14 Изготовляются на заводе или полигоне	
2500×2500	П2 / 1,88			
2900×2500	П3 / 2,18			
3300×2500	П4 / 2,48			
3700×2500	П5 / 2,78	П5а / 3,70		
4100×2500	П6 / 3,07	П6а / 4,10		
4300×2900	П7 / 3,75			
4700×2500		П8 / 4,7		
4700×2900	П9 / 4,1	П9а / 5,46		
5100×4700	15 бетонируются на месте		ПМ1 / 11,45	
5700×4700			ПМ2 / 12,70	
5700×5300			ПМ3 / 14,60	
6500×5300			ПМ4 / 16,85	
6900×5700			ПМ5 / 23,50	
7300×6100				ПМ6 / 32,70
7700×6500				ПМ7 / 37,10
8100×6900				ПМ8 / 40,70

16 Типы фундаментов

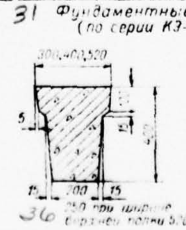


22 Марка подколонника	23 Размеры подошвы, мм	24 Марка плиты	23 Размеры подошвы, мм	24 Марка плиты	23 Размеры подошвы, мм	24 Марка плиты	23 Размеры подошвы, мм
ПК 1-4	1500×1500	П1	2500×1900				
ПК 5-8	1700×1700	П2	2500×2500				
ПК 9-16	1900×1900	П3	2900×2500				
		П4	3300×2500				
		П5	3700×2500				
ПК 17-20		П5	3700×2500	П3	5000×2900	ПМ1	5100×4700
		П6	4100×2500	П4	5000×3300	ПМ2	5700×4700
		П7	4300×2900	П5	5000×3700	ПМ3	5700×5300
				П6	5000×4100		
ПК 21-23		П4	3300×2500	П4	5000×3300		
		П6	4100×2500				
		П9	4700×2900				
ПК 24-29		П9	4700×2900	П6	5000×4100	ПМ3	5700×5300
				П8	5000×4700	ПМ4	6500×5300
				П9	5800×4700	ПМ5	6900×5700
						ПМ6	7300×6100
						ПМ7	7700×6500
						ПМ8	8100×6900

25 Фундамент крайней колонны



31 Фундаментные балки
(по серии КЭ-01-23)

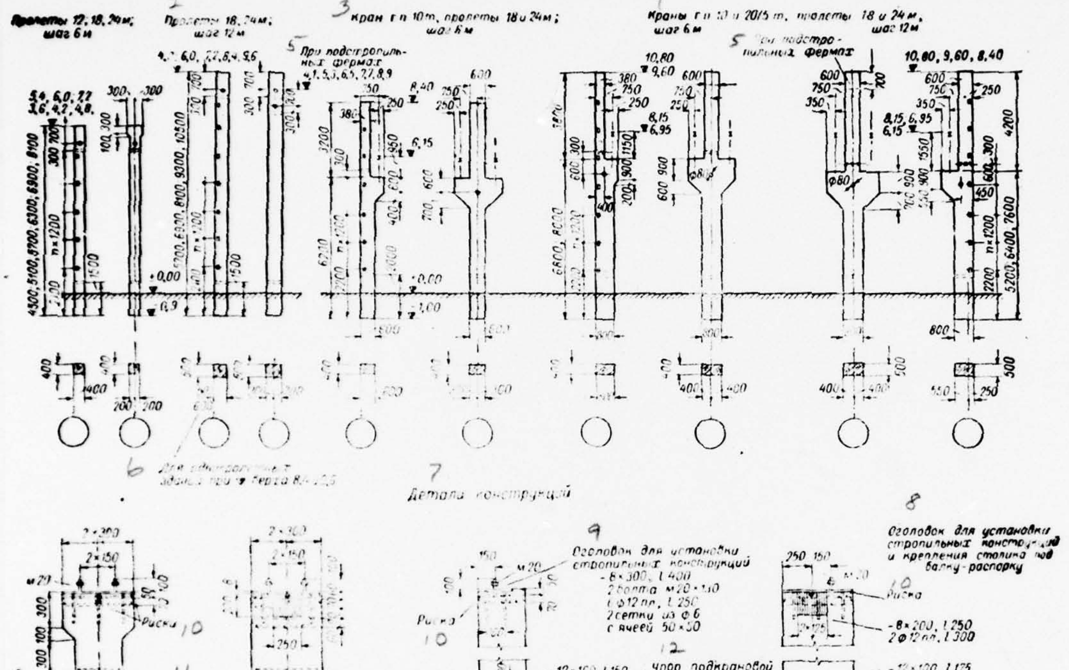


35 Длина балки 4950 и 5950; боковые уклоны 1/20 при бетонировании в неразъемных формах

Key: 1 - bases. 2 - base plates. 3 - width of cap. 4 - width of the section/cut of column .... 5 - section/cuts of columns, mm. 6 - end. 7 - basis/base, mm. 8 - mark/brand of base. 9 - volume of concrete m^3 with height, mm. 10 - ... composite. 11 - mark/brand of plate/slab. 12 - width of basis/base. 13 - monolithic. 14 - are manufactured on plant or range/polygon. 15 - are concreted on the spot. 16 - types of foundations. 17 - for. 18 - without plate/slabs, 19 - on one plate/slab, 20 - on two plate/slabs. 21 - on monolithic plate/slab. 22 - mark/brand of base. 23 - size/dimensions of bottom, mm. 24 - mark/brand of plate/slab. 25 - foundation of extreme column. 26 - footer. 27 - extreme column. 28 - wall panel ... waterproofing - cement mortar ... foundation beam .... 29 - ... reinforced-concrete struts for the support of foundation beams ... with ... with ... are establish/installed on cement mortar. 30 - part of welding plate/slab and base in the presence of the stretching forces. 31 - foundation beams (on series .... 32 - cement mortar of mark/brand .... 33 - leveling layer of sand the condensed soil. 34 - shielding concrete. 35 - length of beam ... and ... side gradient/drafts in ... with concreting in permanent forms. 36 - ... with the width of upper flanges ....

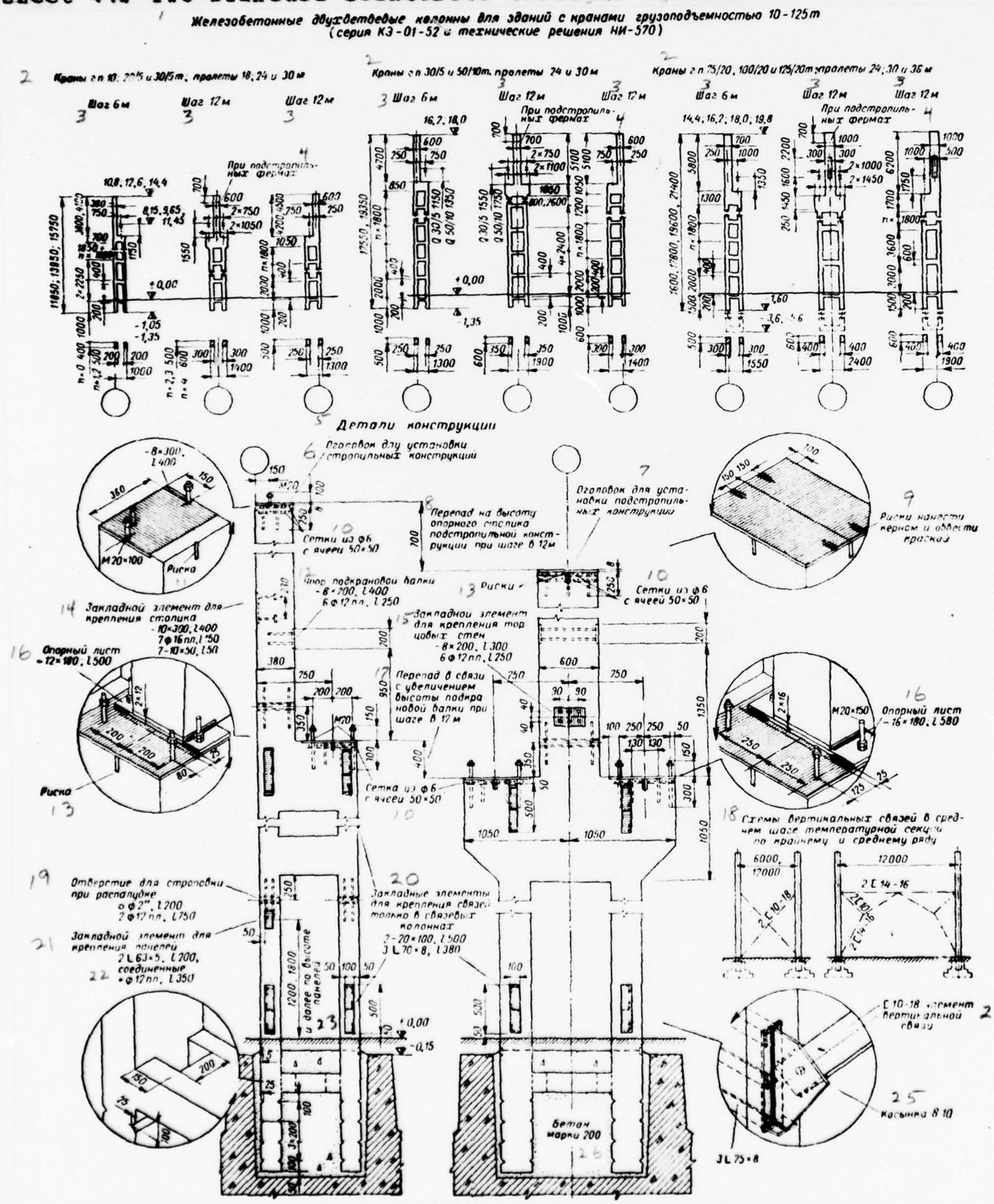
Sheet 40. Reinforced-concrete columns of rectangular cross section.

Железобетонные колонны прямоугольного сечения для зданий без опорных кранов и с кранами грузоподъемностью 10; 20/5m
(серия КЭ-01-49)



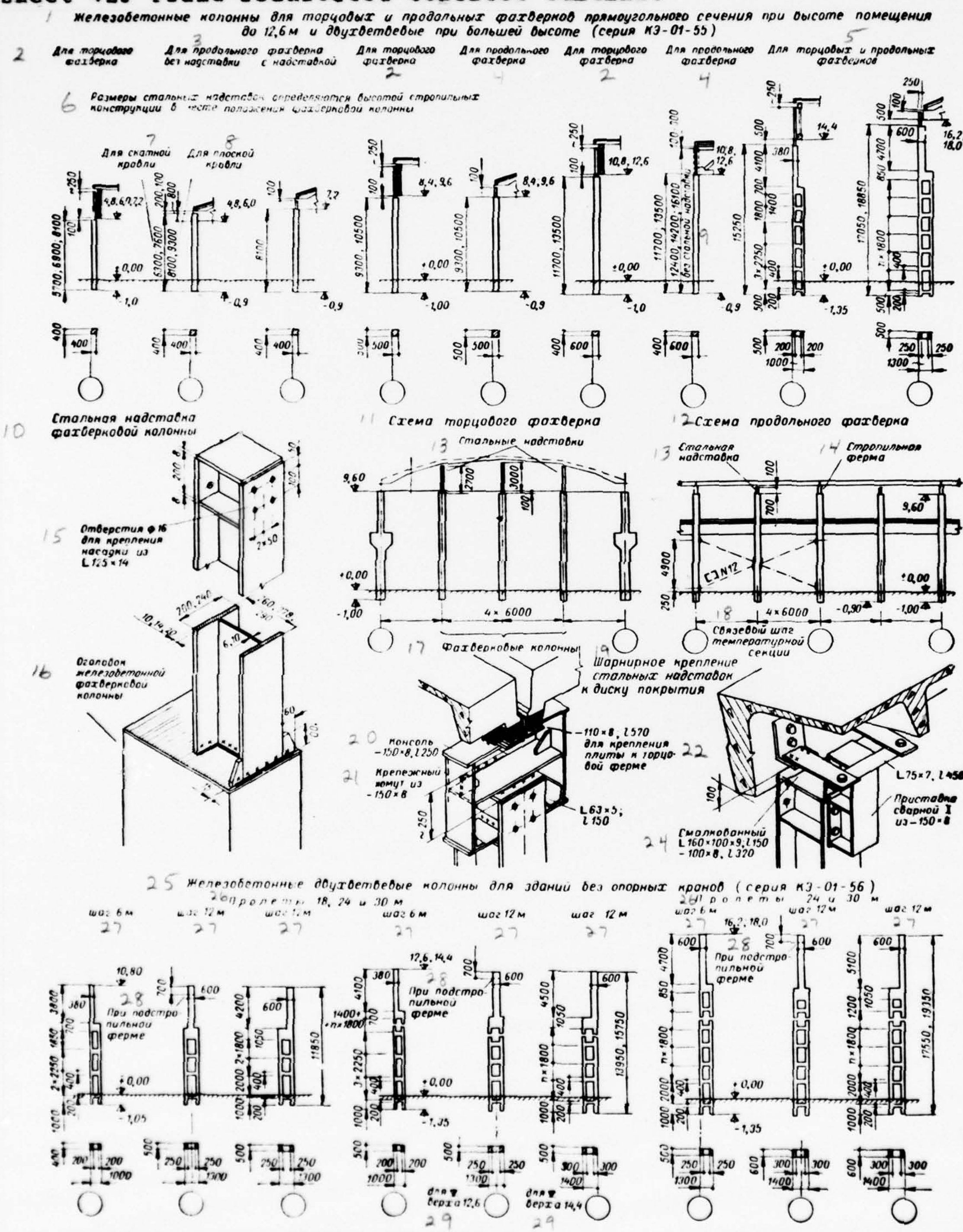
Key: 1 - reinforced-concrete columns of rectangular cross section for buildings without supporting/reference tap/cranes and with tap/cranes by load capacity ... (series .... 2 - flight/spans ... step/pitch .... 3 - tap/crane ... flight/spans ... step/pitch .... 4 - tap/cranes ... and ... flight/spans ... and ... step/pitch .... 5 - with frame-supporting farm/trusses. 6 - for the single-span buildings with ... of top ... and ..... 7 - structural parts. 8 - end for the installation of rafter constructions and fastening stand for girder bracing. 9 - end for the installation of rafter constructions. ... the bolt ... of grid from ... with cells .... 10 - risks. 11 - ... to weld to working fittings of column. 12 - detent of the crane beam .... 13 - support of the crane beam .... 14 - grid from ... with cells .... 15 - hole for slinging during assembly ... and .... 16 - for fastening of stand .... 17 - laying cell/element for fastening of panel .... 18 - hole for slinging with the removal of the molds ..... 19 - hole for slinging with the removal of the molds ..... 20 - hole for slinging during assembly. 21 - stand for beam - spacer. 22 - laying cell/elements for fastening of communication/connections only in connecting columns .... 23 - grooves. 24 - base. 25 - for fastening of rail on ends of beam laying tubes ... with thread ....

Sheet 41. Two-branched reinforced-concrete columns.



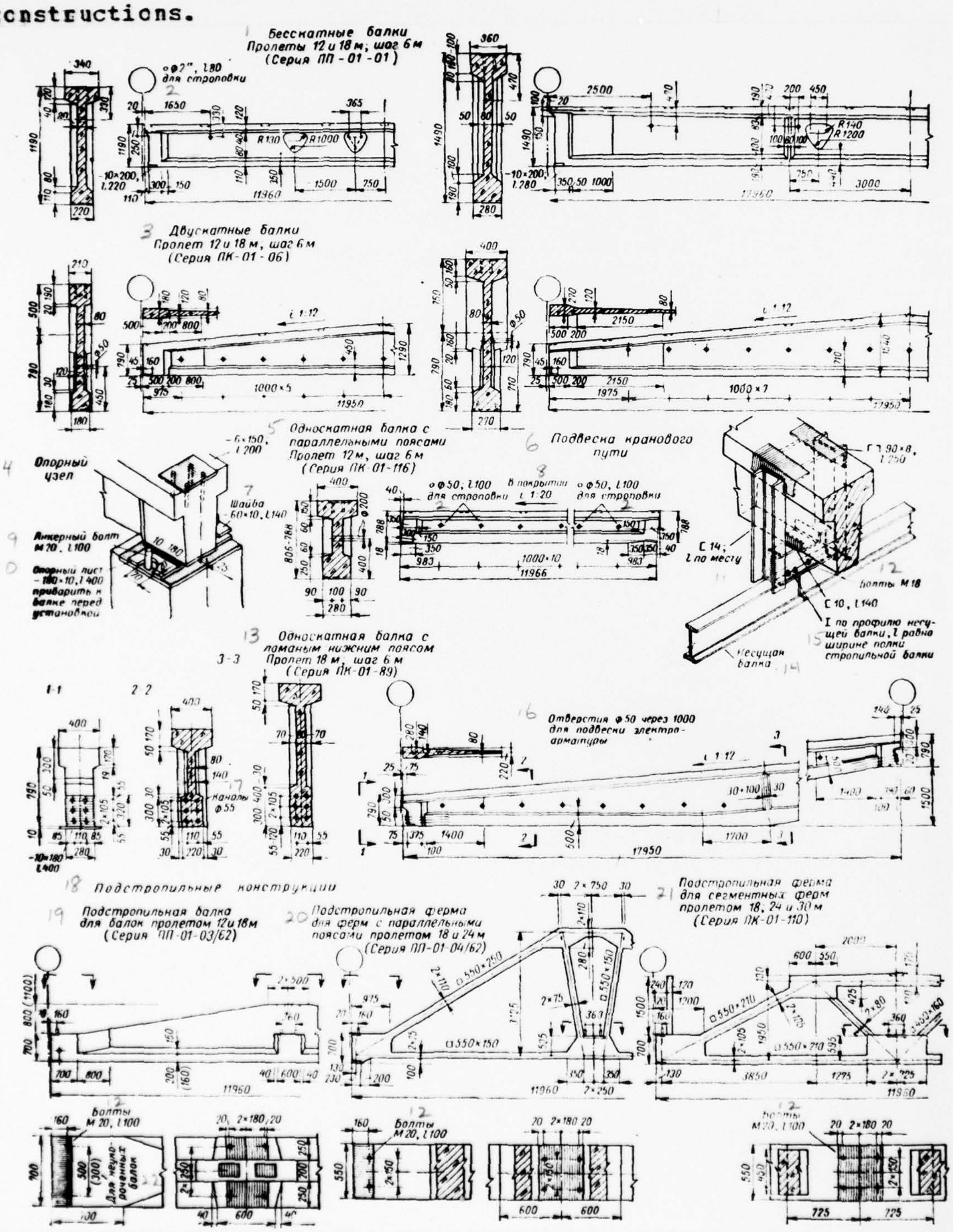
Key: 1 - reinforced-concrete two-branched columns for buildings with tap/cranes by load capacity ... t, (series ... and the technical solutions .... 2 - tap/cranes ... and ... t, flight/spans ... and .... 3 - step/pitch .... 4 - with frame-supporting farm/trusses. 5 - structural parts. 6 - end for the installation of rafter constructions. 7 - end for the installation of frame-supporting constructions. 8 - jump/drop to the height of the supporting/reference stand of frame-supporting construction with the step/pitch in ... ./9 - risks to apply by core and to encircle by color/paint. 10 - grids from ... with cells .... 11 - risk. 12 - detent of the crane beam .... 13 - risks. 14 - laying cell/element for fastening of stand. 15 - laying cell/element for fastening of end-type walls. 16 - supporting/reference sheet .... 17 - jump/drop in connection with an increase in altitude of the crane beam with the step/pitch in .... 18 - patterns of vertical communication/connections in the average/mean step/pitch of temperature section on an extreme and average series. 19 - hole for slinging with the removal of the molds .... 20 - laying cell/elements for fastening of communication/connections only in connecting columns .... 21 - laying cell/element for fastening of panels .... 22 - connected .... 23 - and further on height of panels ... 24 - ... the cell/element of vertical communication/connection. 25 - knee plate .... 26 - concrete of mark/brand ....

Sheet 42. Frame reinforced-concrete columns.



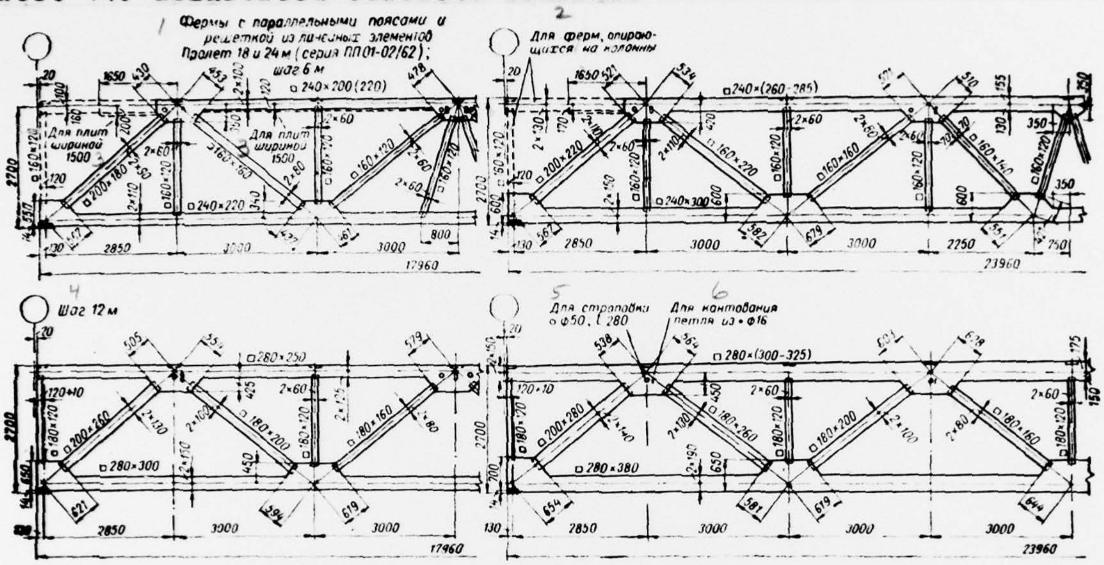
Key: 1 - reinforced-concrete columns for the end-type and longitudinal frameworks of rectangular cross section at the height of location to ... and two-branched at larger height (series .... 2 - for an end-type framework. 3 - for a longitudinal framework without extension with extension. 4 - for a longitudinal framework. 5 - for end-type and longitudinal frameworks. 6 - the size/dimensions of steel extensions they are determined by the height of rafter constructions in the place of the position of frame column. 7 - for sloping roofing. 8 - for flat/plane roofing. 9 - without steel extension. 10 - steel extension of frame column. 11 - pattern of end-type framework. 12 - pattern of longitudinal framework. 13 - steel extension. 14 - truss. 15 - holes .... for fastening nozzles from .... 16 - end of reinforced-concrete frame column. 17 - frame columns. 18 - connecting step/pitch of temperature section. 19 - hinge fitting of steel extensions to the disk of coating. 20 - arm .... 21 - fastening clamp from ..... 22 - ... for fastening of plate/slab to end-type farm/truss. 23 - attachment of welded ... from .... 24 - lightly-forged .... 25 - reinforced-concrete two-branched columns for buildings without supporting/reference tap/cranes (series .... 26 - flight/spans ... and .... 27 - step/pitch .... 28 - with frame-supporting farm/truss. 29 - for ... a top ....

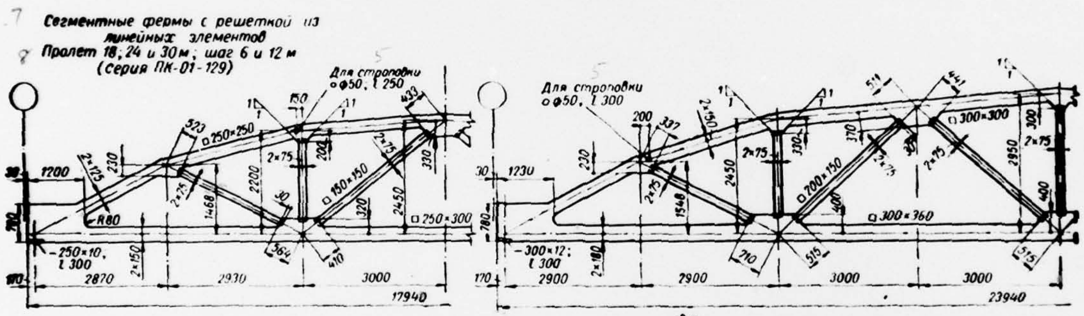
Sheet 43. Reinforced-concrete rafter beams and frame-supporting constructions.

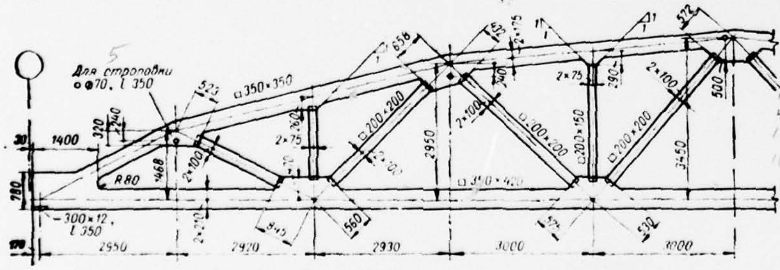


Key: 1 - nonsliding beams. Flight/spans ... and ... step/pitch ... (series .... 2 - ... for slinging. 3 - two-slope surface beams flight/span ... and ... step/pitch ... (series .... 4 - supporting unit. 5 - lean-to beam with parallel belt/zones flight/span ... step/pitch ... (series .... 6 - suspension of crane way. 7 - washer .... 8 - in coating .... 9 - anchor bolt .... 10 - supporting/reference sheet ... to weld to the beam before the installation. 11 - ... on place. 12 - bolts .... 13 - lean-to beam with broken lower belt/zone flight/span ... step/pitch ... (series .... 14 - carrier beam. 15 - ... along the airfoil/profile of the carrier beam; ... it is equal to width the flanges of rafter beam. 16 - holes ... through ... for the suspension of electrical armature. 17 - channels .... 18 - frame-supporting constructions. 19 - frame-supporting beam for beams by flight/span ... and ... (series ..... 20 - frame-supporting farm/truss for farm/trusses with parallel belt/zones by flight/span ... and ... (series .... 21 - frame-supporting farm/truss for segmental farm/trusses by flight/span ... (series .... For the unshortened beams.

Sheet 44. Reinforced-concrete trusses.

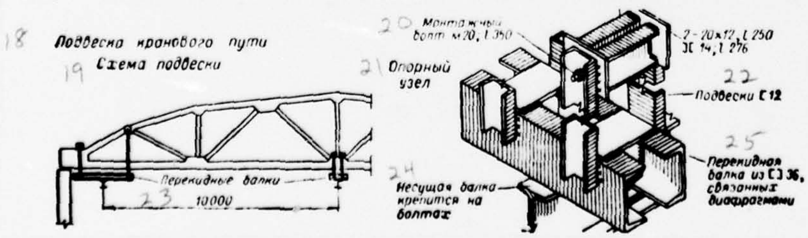






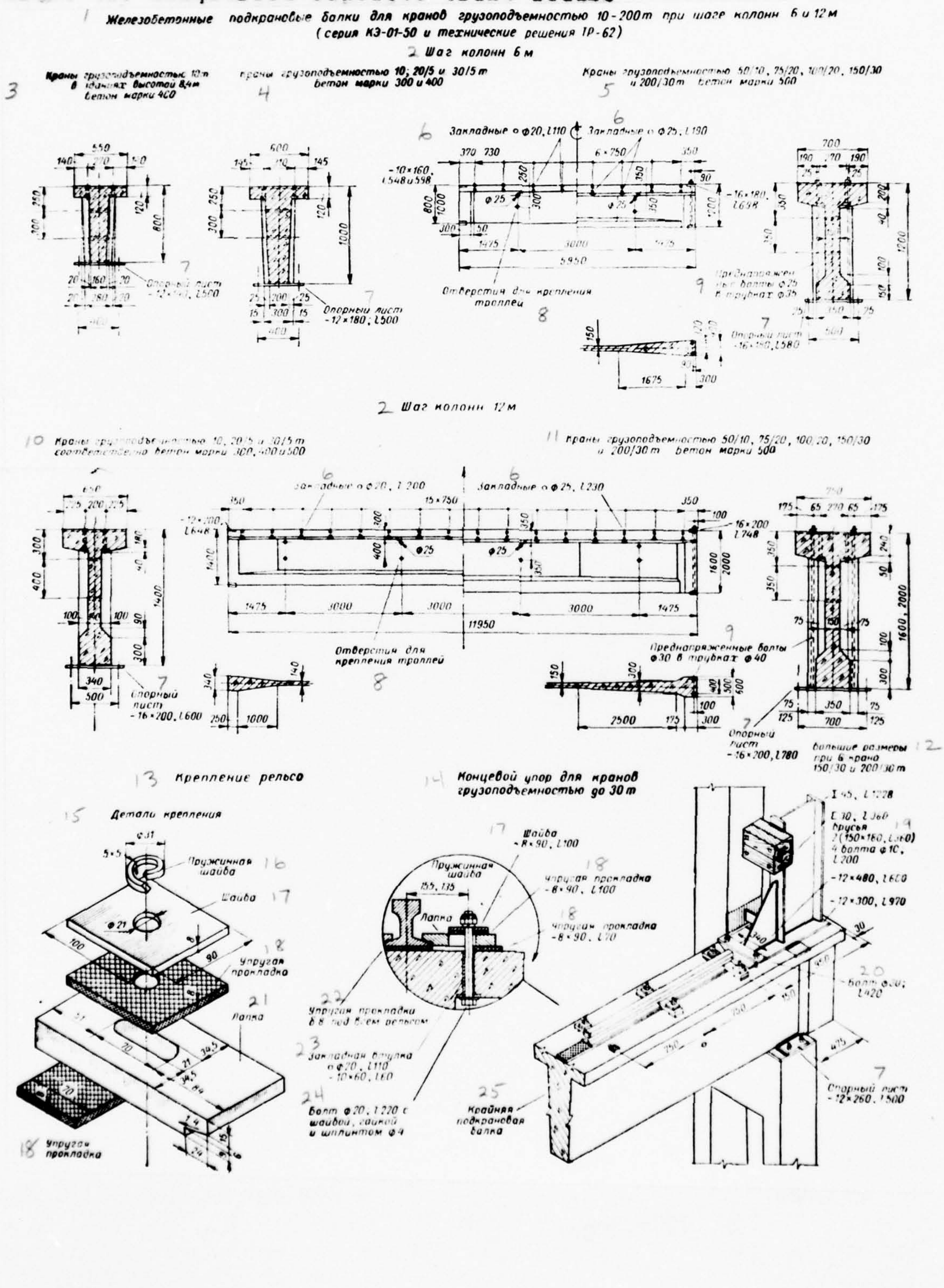
9 Сечения элементов сегментных ферм в мм при различных расчетных нагрузках

Шаг 6 м, Нагрузка, кг/м²		350	550	
Шаг 12 м, Нагрузка, кг/м²			350	550
Пролет, м 18	Пояса: верхний / нижний	250×180 / 200	250×250 / 300	300×250 / 200
	Решетка	150×120	150×150	150×150
24	Пояса верхний / нижний	250×280 / 300	300×300 / 360	350×[illegible] / [illegible]
	Решетка	150×150	200×150	200×150
30	Пояса верхний / нижний	300×250 / 300	350×350 / 420	
	Решетка раскосы / стойки	200×150	200×200 / 150	



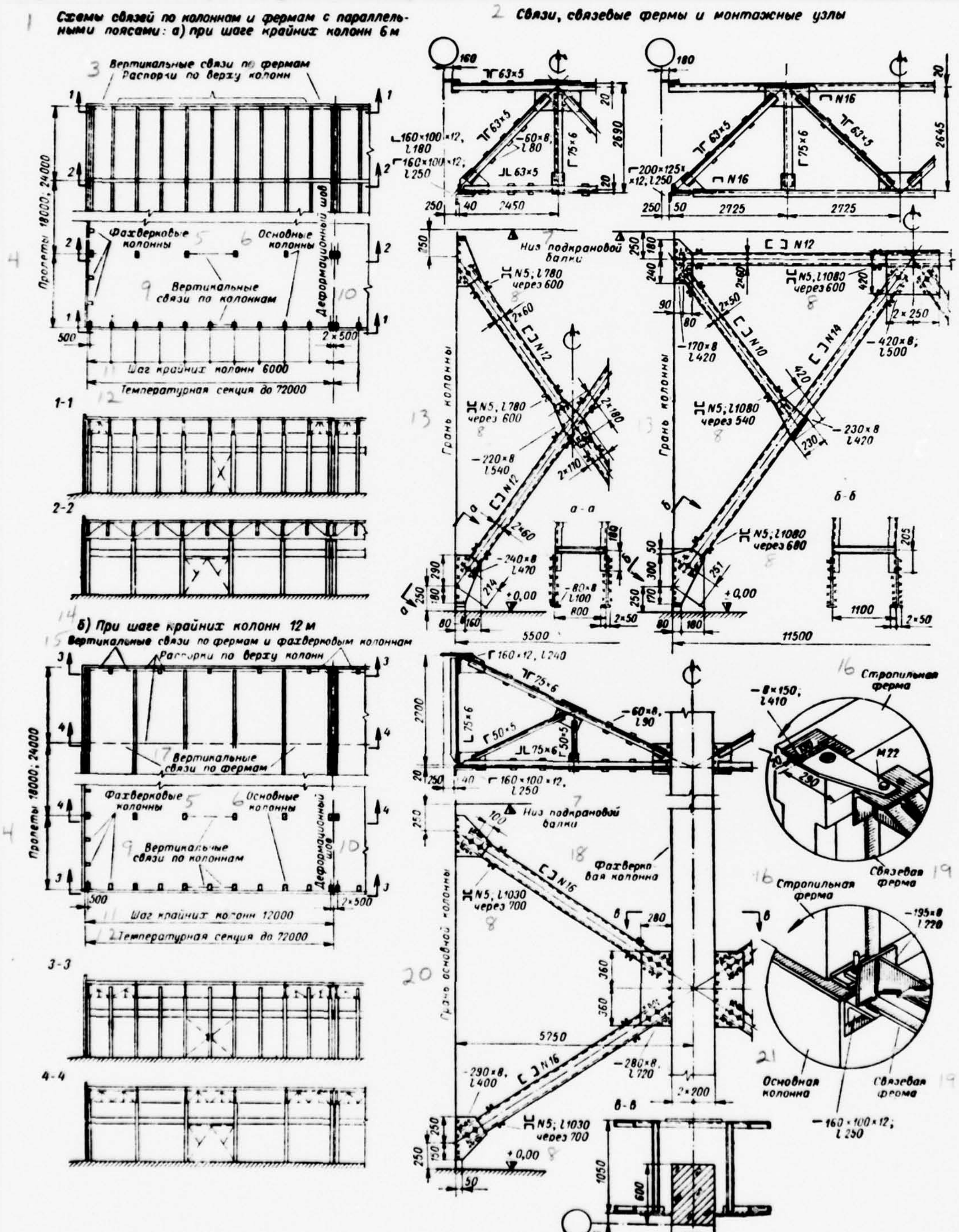
Key: 1 - farm/trusses with parallel belt/zones and grate from linear cell/elements flight/span ... and ... (series ... step/pitch .... 2 - for the farm/trusses, which rest on column. 3 - for plate/slabs by width .... 4 - for plate/slabs by width .... 4 - step/pitch .... 5 - for slinging .... 6 - for turning loop from .... 7 - segmental farm/trusses with grate from linear cell/elements. 8 - flight/span ... and ... step/pitch ... and ... (series .... 9 - section/cuts of the cell/elements of segmental farm/trusses in mm with different design loads. 10 - load, kg/m². 11 - flight/span, m. 12 - belt/zones. 13 - upper. 14 - lower. 15 - grate. 16 - struts. 17 - strut. 18 - suspension of crane way. 19 - pattern of suspension. 20 - erection bolt ... / of 21 - supporting unit. 22 - suspensions .... 23 - reversing beams .... 24 - the carrier beam it is fastened to bolts. 25 - reversing beam from ... connected by diaphragms.

Sheet 45. Reinforced-concrete crane beams.



Key: 1 - reinforced-concrete crane beams for tap/cranes by load capacity ... t with the step/pitch of columns ... and ... (series ... and the technical solutions .... 2 - step/pitch of columns .... 3 - tap/cranes by load capacity ... t in buildings by height ... concrete of mark/brand .... 4 - tap/cranes by load capacity ... and ... t concrete of mark/brand ... and .... 5 - tap/cranes by load capacity ... and ... concrete of mark/brand .... 6 - laying .... 7 - supporting/reference sheet .... 8 - holes for fastening trolley. 9 - prestressed bolts ... in tubes .... 10 - tap/cranes by load capacity ... and ... t respectively concrete of mark/brand ... and ..... 11 - tap/cranes by load capacity ... and ... t concrete of mark/brand .... 12 - high size/dimensions with ... of tap/crane ... and ... t. 13 - fastening rail. 14 - limit stop for tap/cranes by load capacity to ... t. 15 - fastenings. 16 - spring washer. 17 - washer. 18 - cushion. 19 - ... the bars ... of bolt .... 20 - bolt .... 21 - clamp. 22 - the cushion ... of odes by all rail. 23 - laying bushing ..... 24 - bolt ... with washer, by nut and split pin .... 25 - extreme crane beam.

Sheet 46. Steel connections of reinforced-concrete constructions.



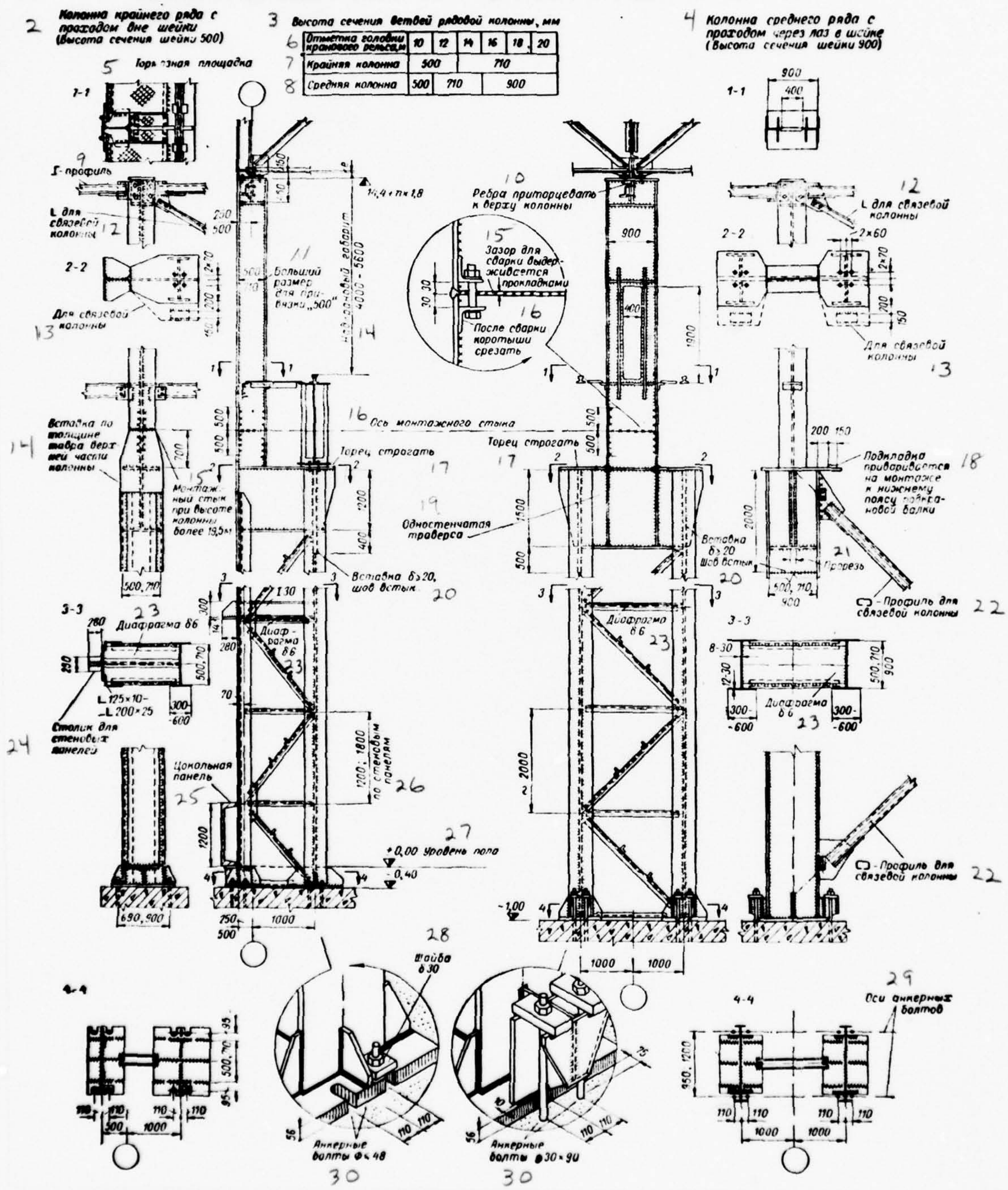
Key: 1 - patterns of communication/connections on columns and farm/trusses with the parallel belt/zones: a) with the step/pitch of extreme columns .... 2 - communication/connections, connecting farm/trusses and assembling units. 3 - vertical communication/connections on the farm/trusses of spacer on the top of columns. 4 - flight/spans .... 5 - frame columns. 6 - basic columns. 7 - bottom of the crane beam. 8 - ... through .... 9 - vertical communication/connections on columns. 10 - deformation weld. 11 - step/pitch of extreme columns .... 12 - temperature section to .... 13 - face of column. 14 - b) with the step/pitch of extreme columns ..... 15 - vertical communication/connections on farm/trusses and the frame columns of spacer on the top of columns. 16 - truss. 17 - vertical communication/connections on farm/trusses. 18 - frame column. 19 - connecting farm/truss. 20 - face of basic column. 21 - basic column.

Sheet 47. Steel columns.

Стальные колонны зданий с кранами большой грузоподъемности (серия КЭ-01-43)

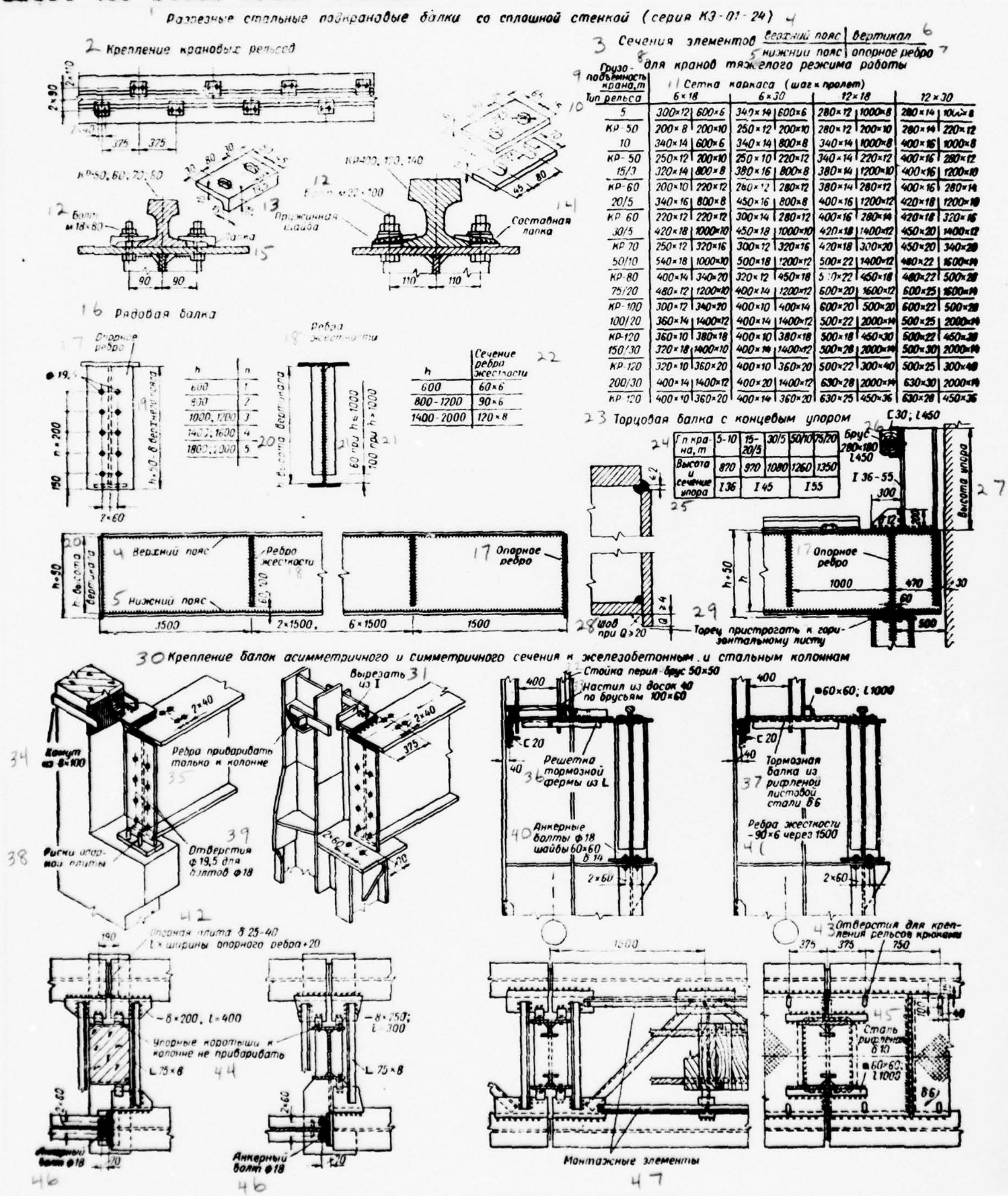
3 Высота сечения ветвей рядовой колонны, мм

6 Отметка головки кранового рельса, м	10	12	14	16	18	20
7 Крайняя колонна	500		710			
8 Средняя колонна	500	710		900		



Key: 1 - steel columns of buildings with the tap/cranes of large load capacity (series .... 2 - column of an extreme series with pass out of neck (height of the section/cut of neck .... 3 - height of the section/cut of the branches of series column, mm. 4 - column of an average series with the pass through the access in neck (height of the section/cut of neck .... 5 - hand-brake platform. 6 - mark of the knot/cap of crane rail, m. 7 - extreme column. 8 - average column. 9 - airfoil/profile. 10 - fin/edges to fasten to the top of column. 11 - larger size/dimension for joining .... 12 - ... for connecting column. 13 - for connecting column. 14 - inset according to the thickness of the brand of the upper part of the column. 15 - field joint at the height of column it is more .... 16 - axle/axis of field joint. 17 - end/face to shape. 18 - block/backing it is welded on assembly to the lower belt/zone of the crane beam. 19 - single-walled crosshead. 20 - inset ... butt seam. 21 - gash. 22 - ... airfoil/profile for connecting column. 23 - diaphragm ..... 24 - stand for wall panels. 25 - base panel. 26 - on wall panels. 27 - ... floor level. 28 - washer .... 29 - axle/axes of anchor bolts. 30 - anchor bolts ....

Sheet 48. Steel crane beams.



Сечения элементов: верхний пояс | вертикал / нижний пояс | опорное ребро — для кранов тяжелого режима работы

Грузоподъемность крана, т / Тип рельса	6×18		6×30		12×18		12×30	
5	300×12	600×6	340×14	600×6	280×12	1000×8	280×14	1000×8
КР-50	200×8	200×10	250×12	200×10	280×12	200×10	280×14	220×12
10	340×14	600×6	340×14	800×8	340×14	1000×8	400×16	1000×8
КР-50	250×12	200×10	250×10	220×12	340×14	220×12	400×16	280×12
15/3	320×14	800×8	380×16	800×8	380×14	1200×10	400×16	1200×10
КР-60	200×10	220×12	260×12	280×12	380×14	280×12	400×16	280×14
20/5	340×16	800×8	450×16	800×8	400×16	1200×12	420×18	1200×10
КР-60	220×12	220×12	300×14	280×12	400×16	280×14	420×18	320×16
30/5	420×18	1000×10	450×18	1000×10	420×18	1400×12	450×20	1400×12
КР-70	250×12	320×16	300×12	320×16	420×18	300×20	450×20	340×20
50/10	540×18	1000×10	500×18	1200×12	500×22	1400×12	480×22	1600×14
КР-80	400×14	340×20	320×12	450×18	500×22	450×18	480×22	500×20
75/20	480×12	1200×10	400×14	1200×12	600×20	1600×12	600×25	1600×14
КР-100	300×12	340×20	400×10	400×14	600×20	500×20	600×22	500×20
100/20	360×14	1400×12	400×14	1400×12	500×22	2000×14	500×25	2000×14
КР-120	360×10	380×18	400×10	380×18	500×18	450×30	500×22	450×30
150/30	320×18	1400×10	400×14	1400×12	500×28	2000×14	500×30	2000×14
КР-120	320×10	360×20	400×10	360×20	500×22	300×40	500×25	300×40
200/30	400×14	1400×12	400×20	1400×12	630×28	2000×14	630×30	2000×14
КР-120	400×10	360×20	400×14	360×20	630×25	450×36	630×28	450×36

h	n
600	1
900	2
1000, 1200	3
1400, 1600	4
1800, 2000	5

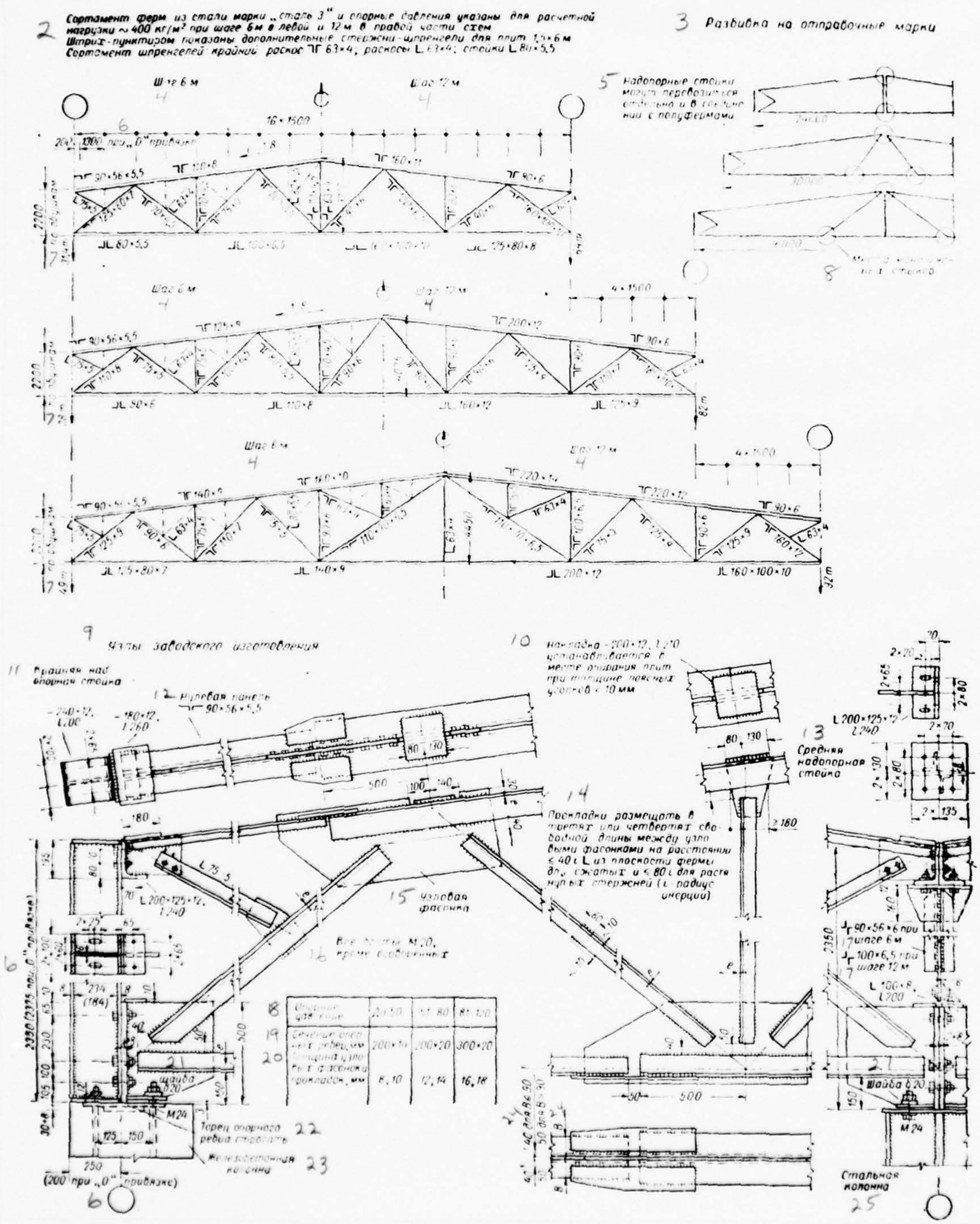
h	Сечение ребра жесткости
600	60×6
800-1200	90×6
1400-2000	120×8

Гп крана, т	5-10	15-20/5	30/5	50/10	75/20
Высота и сечение упора	870	970	1080	1260	1350
	I36	I45		I55	

Key: 1 - split steel crane beams with solid wall (series .... 2 - fastening crane rails. 3 - section/cuts of cell/elements. 4 - upper belt/zone. 5 - lower belt/zone. 6 - vertical. 7 - fulcrum of work. 8 - for the tap/cranes of arduous duty. 9 - crane load, t. 10 - type of rail. 11 - grid of framework/body (step/pitch x flight/span). 12 - bolt .... 13 - spring washer. 14 - compound/composite clamp. 15 - clamp. 16 - series beam. 17 - fulcrum. 18 - stiffening ribs. 19 - ... upper belt/zone. 20 - ... the height of vertical. 21 - ... with .... 22 - section/cut of stiffening rib. 23 - end-type beam with by limit stop. 24 - ... tap/crane, t. 25 - height and section/cut of detent. 26 - beam .... 27 - height of detent. 28 - weld with .... 29 - end/face to fit to horizontal sheet. 30 - fastening the beams of asymmetric and symmetrical section/cut to reinforced-concrete and steel columns. 31 - to cut from .... 32 - strut rail- beam .... 33 - flooring from panels ... on bars ..... 34 - clamp from .... 35 - fin/edges to weld only to column. 36 - grate of braking farm/truss from ..... 37 - braking beam made of riffled sheet steel .... 38 - risks of base plate. 39 - holes ... for bolts ..... 40 - anchor bolts ... of washer .... 41 - stiffening ribs ... through .... 42 - base plate ... of the width of fulcrum ..... 43 - holes for fastening of rails by hangers. 44 - persistent bolsters to column not to weld. 45 - anchor bolt .... 47 - assembling cell/elements.

Sheet 49. Steel trusses with the gradient/draft of upper belt/zone 1:8.

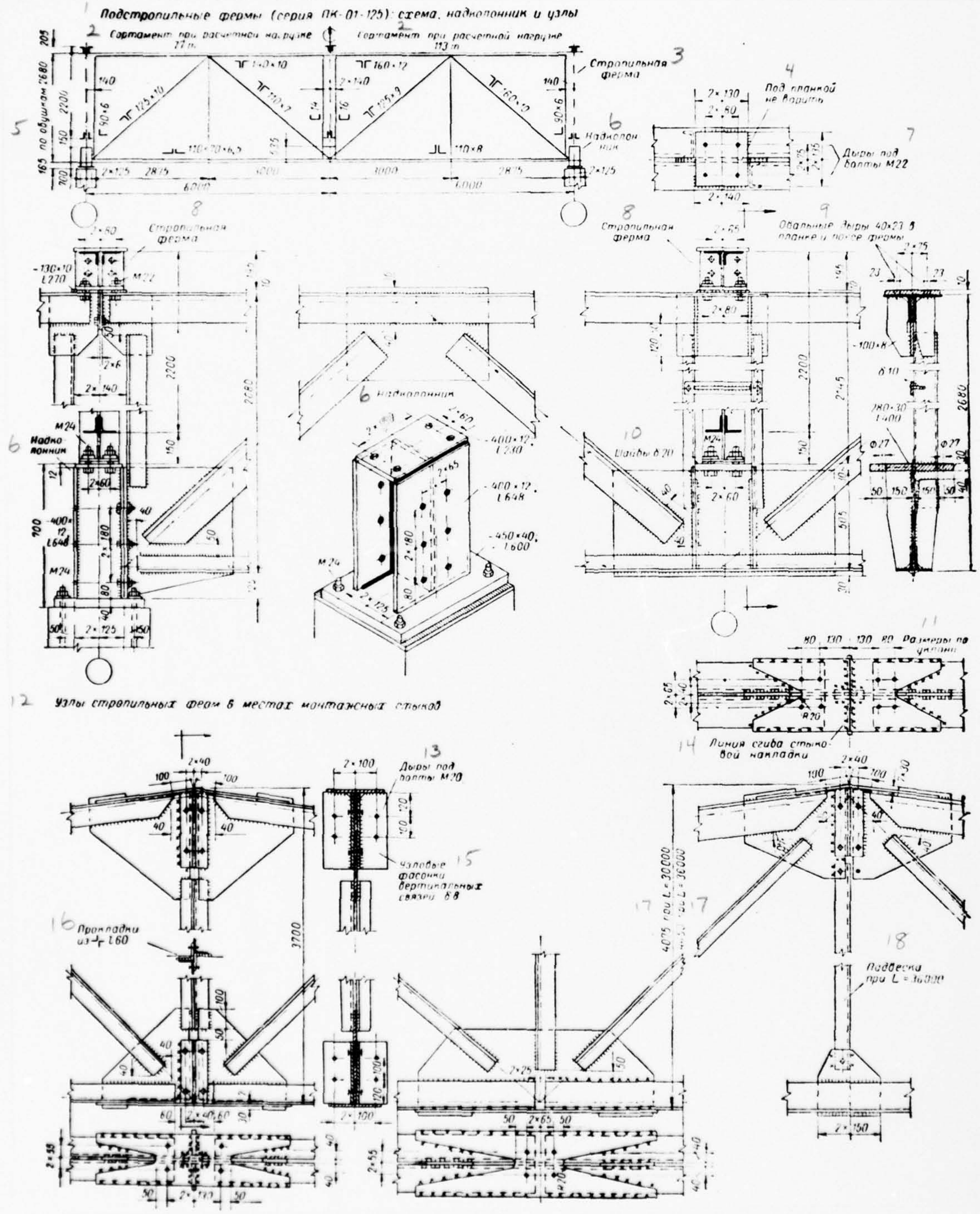
1 Стальные стропильные фермы пролетом 24, 30 и 36м с уклоном верхнего пояса 1:8 при шаге 6 и 12м (серия ПК-01-125)



18 Опорные давление	До 50	51-80	81-120
19 Сечение опорного ребра, мм	200×14	200×20	300×20
20 Толщина узловых фасонок и прокладок, мм	8, 10	12, 14	16, 18

Key: 1 - steel trusses by flight/span ... and ... with the gradient/draft of upper belt/zone ... with step/pitch ... and ... (series .... 2 - the assortment of farm/trusses made of steel of mark/brand "steel 3" and bearing pressure are shown for design load ... kg/m² with the step/pitch ... in left and ... in the right side of the patterns dot-dash line are shown additional rod-strut frames for plate/slabs ... the assortment of strut frames extreme strut ... the struts ... of strut .... 3 - laying out to shipping mark/brands. 4 - step/pitch .... 5 - support struts can be transported separately and in connections with semitrusses. 6 - with ... joining. 7 - on pickaxes. 8 - the places of assembling it is butting. 9 - units of prefabrication. 10 - cover plate - ... are establish/installed in the place of the support of plate/slabs with the thickness of angle flanges .... 11 - extreme support strut. 12 - zero panel. 13 - average support strut. 14 - packing to place in thirds or fourths of free length between junction/unit junction plates at a distance ... from the plane of farm/truss for compressed ... for the tie bars (i - radius of inertia). 15 - junction/unit junction plate. 16 - all bolts ... except those stipulated. 17 - ... with step/pitch .... 18 - bearing pressure. 19 - section/cut of fulcra, mm. 20 - thickness of the junction/unit of profile and of packing, mm. 21 - washer .... 22 - end/face of fulcrum to shape. 23. Reinforced-concrete column. 24 - ... for ..... 25 - steel column.

Sheet 50. Steel frame-supporting farm/trusses and the assembling units of the trusses.



Key: 1 - frame-supporting farm/trusses (series ... pattern, column cap and units. 2 - assortment at rated load. 3 - truss. 4 - ccccooooooooooooooooooooooooooooooooooooocoocccooooooooooooooooooo under plate/bar not to cook. 5 - ... on pickaxes .... 6 - column cap. 7 - holes for bolts..... 8 - truss. 9 - oval holes ... in plate/bar and flange. 10 - washers .... 11 - size/dimensions on gradient/draft. 12 - the units of the trusses ... the places of assembling it is butting. 13 - holes - junction/unit junction plates of vertical communication/connections ..... 16 - packing from .... 17 - ... with .... 18 - suspension with ....

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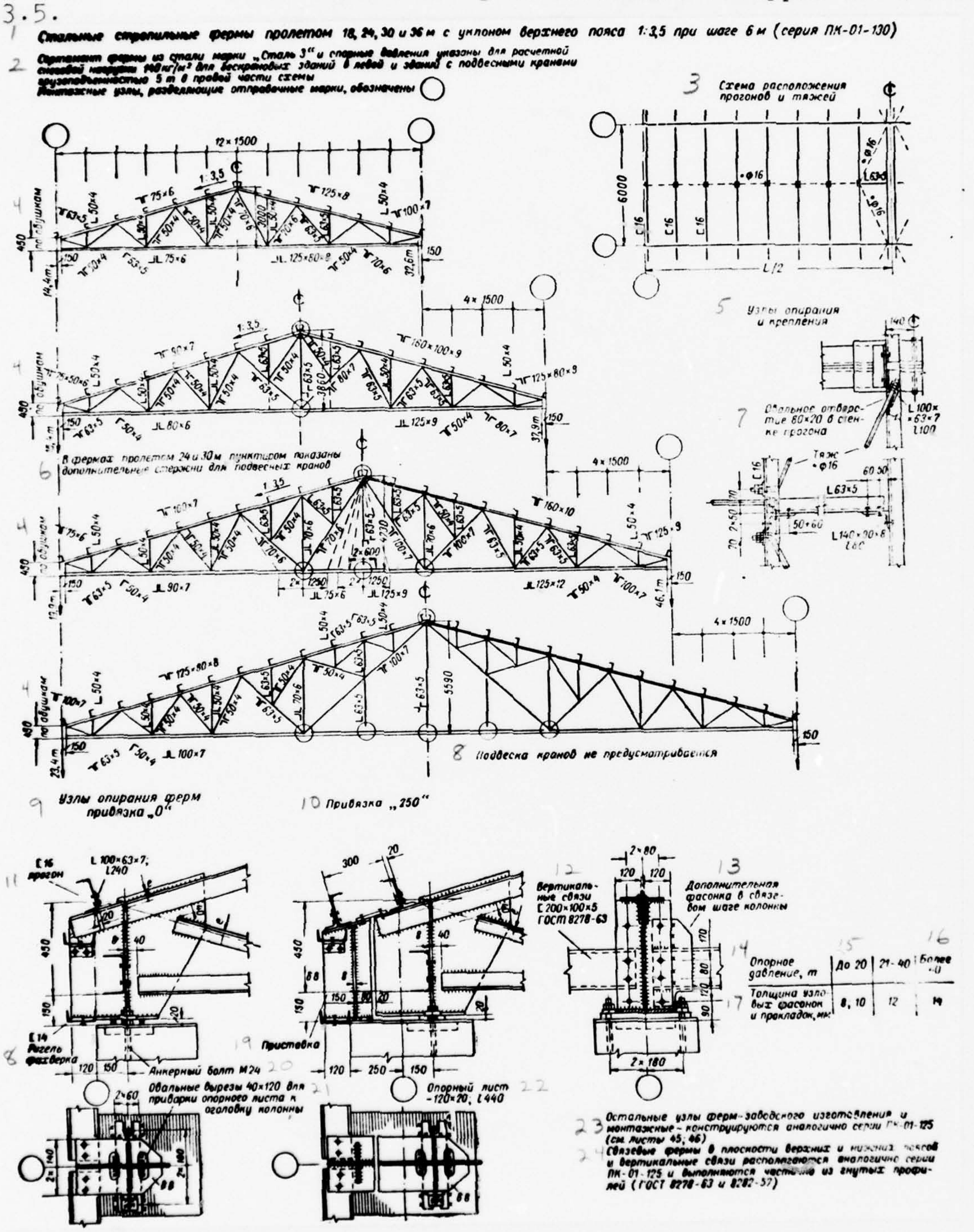
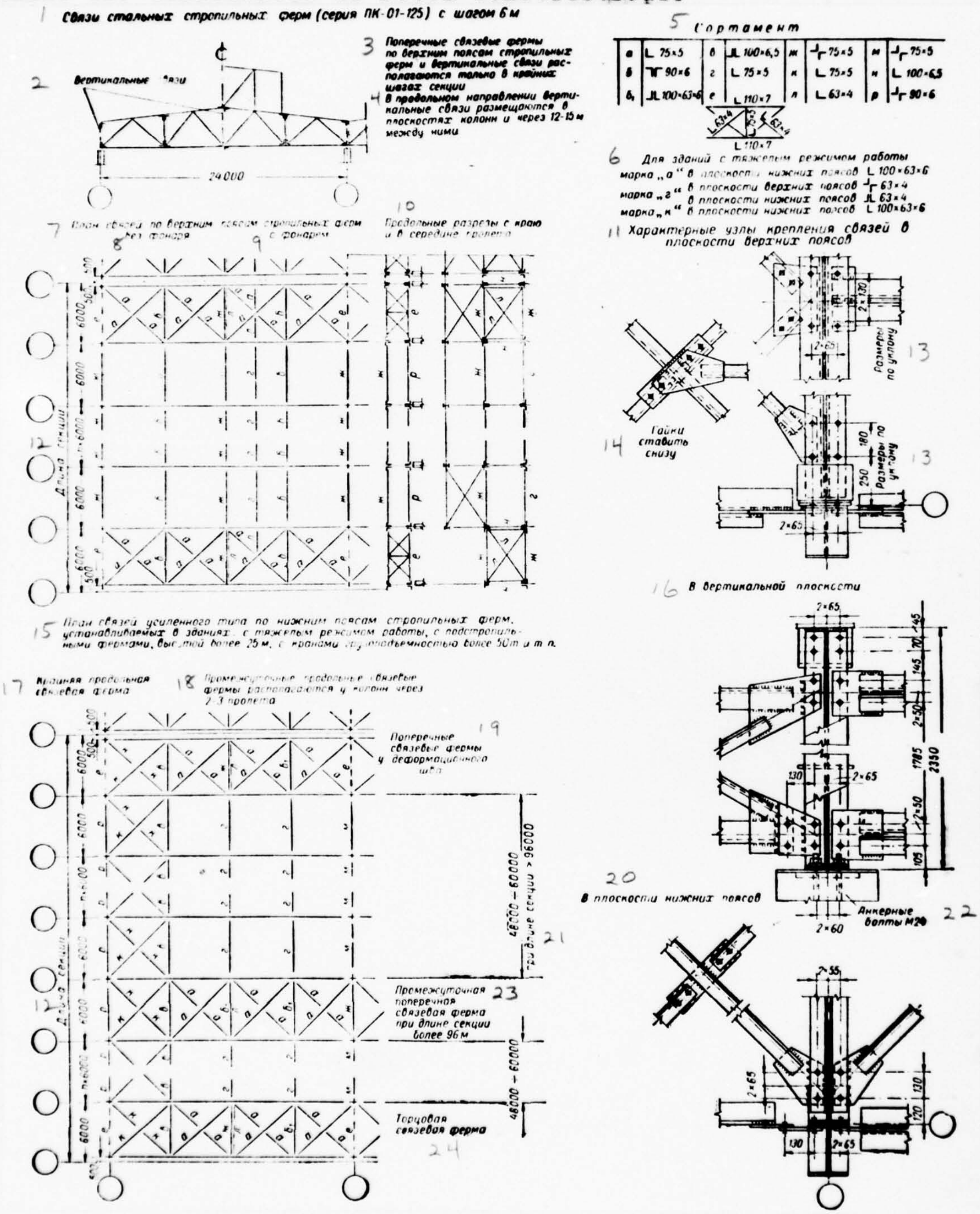
Sheet 51. Steel trusses with the gradient/draft of upper belt/zone 1:3.5.



Key: 1 - steel trusses by flight/span ... and ... with the gradient/draft of upper belt/zone ... with step/pitch ... (series ...). 2 - the assortment of farm/truss made of steel of mark/brand "steel 3" and disputable/debatable pressures are shown for calculated load due to snow ... kg/m² for cockless buildings in left and buildings with suspension tap/cranes by load capacity 5 t in the right side of the pattern. Assembling units, which divide shipping mark/brands, designated. 3 - diagram of the layout of drive/girders and of belts. 4 - ... on pickaxes. 5 - units of support and fastening. 6 - in farm/trusses by flight/span ... and ... by dotted line are shown additional rods for suspension tap/cranes. 7 - elongated hole ... in the wall of drive/girder. 8 - the suspension of tap/cranes it is not provided for. 9 - units of the support of farm/trusses joining ..... 10 - joining .... 11 - ... drive/girder. 12 - vertical communication/connections ... of GOST [99sp04 - All-union State Standard] .... 13 - additional junction plate in connecting step/pitch of column. 14 - bearing pressure, t. 15 - to. 16 - it is more .... 17 - thickness of junction/unit junction plates and packing, mm. 18 - cross bar of framework. 19 - attachment. 20 - anchor bolt .... 21 - oval grooves ... for welding of supporting/reference sheet to the end of column. 22 - supporting/reference sheet. 23 - the remaining units of farm/truss-plant manufacture and assembling - are designed

analogously with series ... (see sheets .... 24 - connecting farm/trusses in the plane of upper and lower belt/zones and vertical communication/connections are furnished analogously with series ... and are fulfilled partially from the bent airfoil/profiles (GOST ... and ....

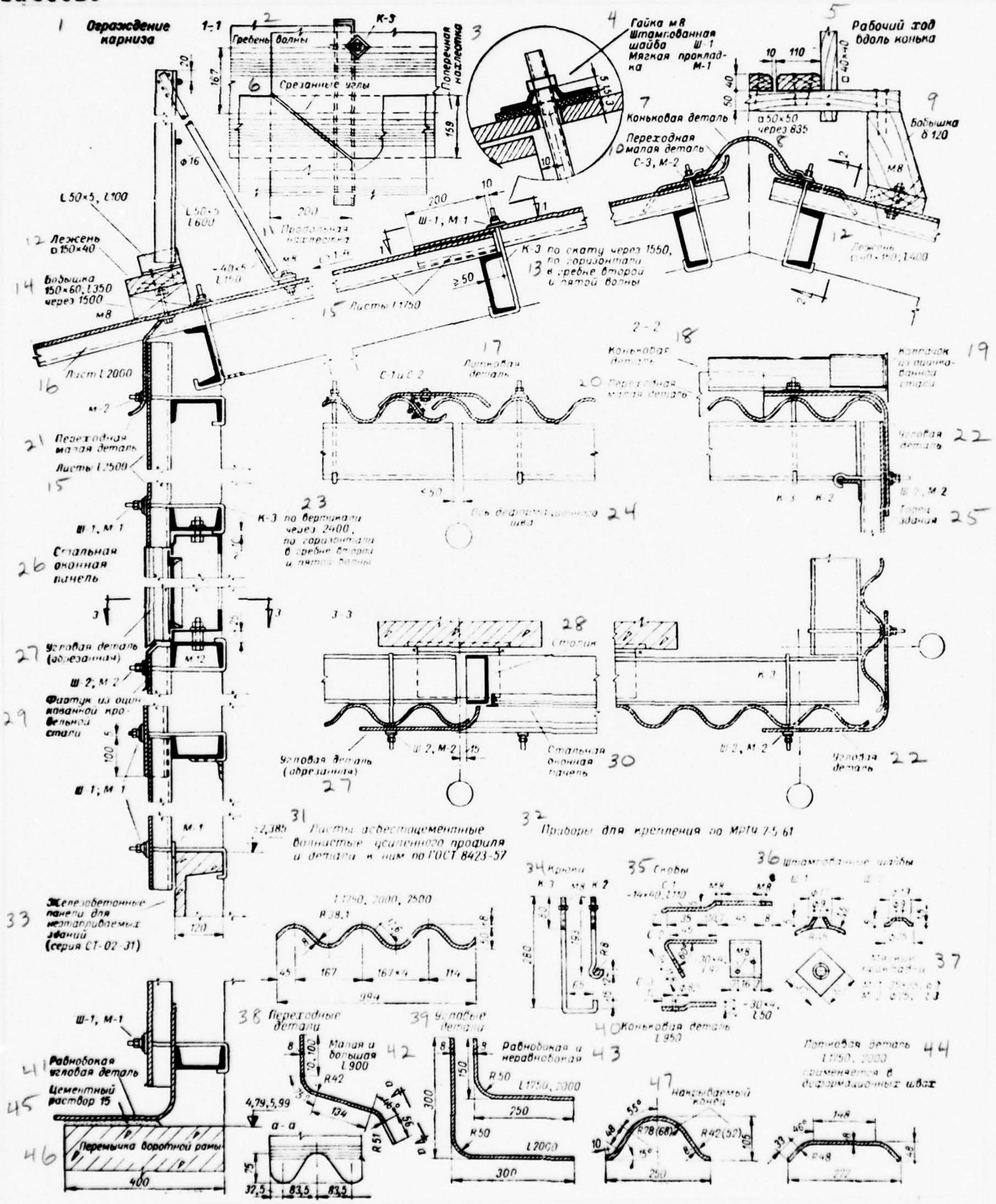
Sheet 52. Connections of steel constructions.



Key: 1 - communication/connections of steel trusses (series ... with step/pitch .... 2 - vertical communication/connections. 3 - transverse connecting farm/trusses along the upper belt/zones of the trusses and vertical communication/connections are furnished only in the extreme step/pitches of section. 4 - lengthwise vertical communication/connections are placed in the planes of columns and through ... between them. 5 - assortment. 6 - for buildings with arduous duty mark/brand ... in the plane of lower belt/zones ... in the plane of upper belt/zones ... mark/brand ... in the plane of lower belt/zones ... mark/brand ... in the plane of lower belt/zones .... 7 - communication plan on the upper belt/zones of the trusses. 8 - without lamp/canopy. 9 - with lamp/canopy 10 - longitudinal sections with to edge and in the middle of flight/span. 11 - characteristic points of attachment of communication/connections in the plane of upper belt/zones. 12 - length of section. 13 - to size/dimension on gradient/draft. 14 - nuts to place from below. 15 - communication plan of intensive type on the lower belt/zones of the trusses, adjustable in the buildings: with arduous duty, with frame-supporting farm/trusses, by height it is more ... with tap/cranes by the load capacity more ... t and the like. 16 - in vertical plane. 17 - extreme longitudinal connecting farm/truss. 18 - intermediate longitudinal connecting farm/trusses they are furnished at the columns through ... of flight/span. 19 - transverse connecting

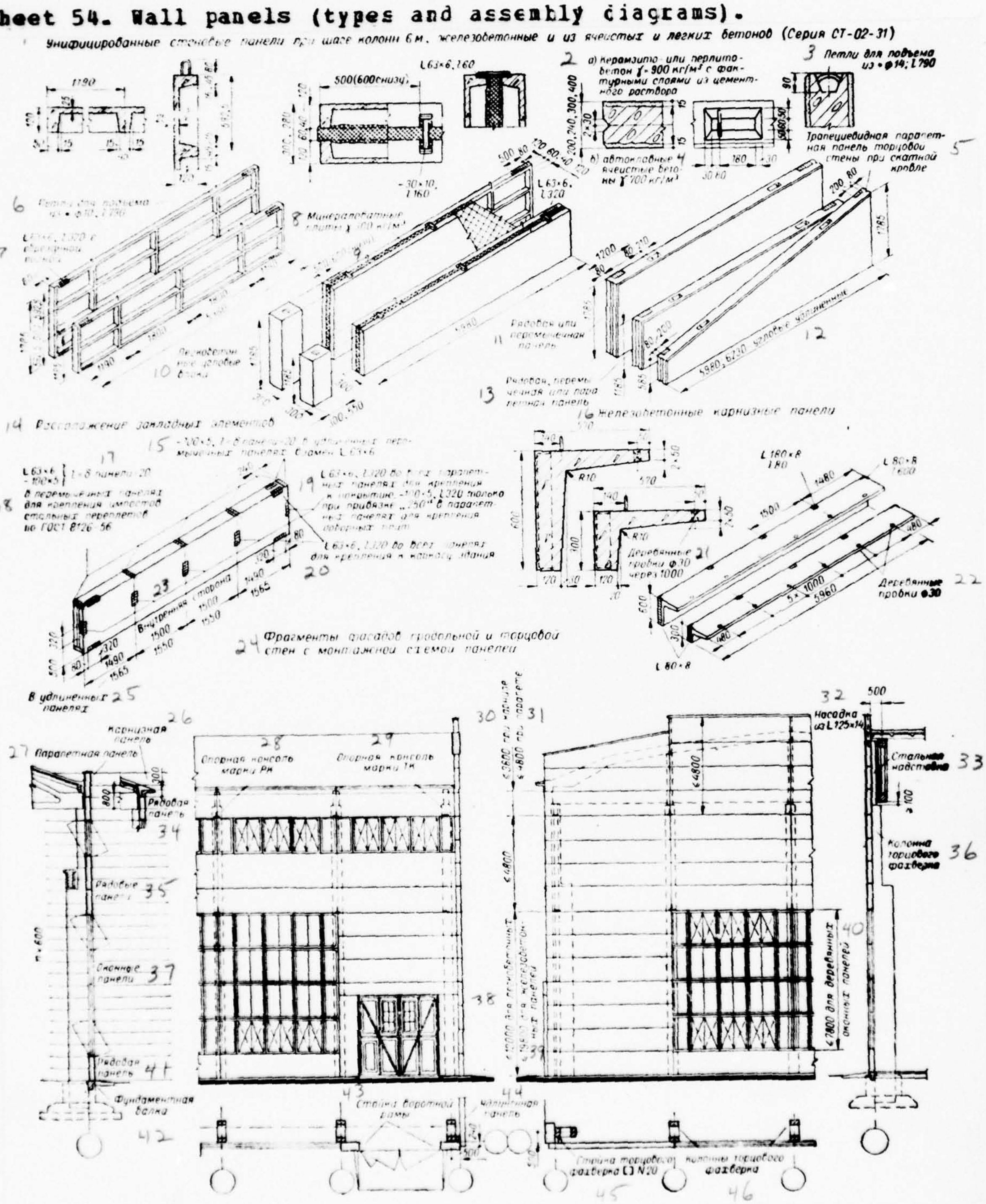
farm/trusses of deformation weld. 20 - in the plane of lower belt/zones. 21 - at the length of section .... 22 - anchor bolts .... 23 - intermediate transverse connecting farm/truss at the length of section it is more .... 24 - end-type connecting farm/truss.

Sheet 53. Enclosure/protections frcm corrugated asbestos cement sheets.



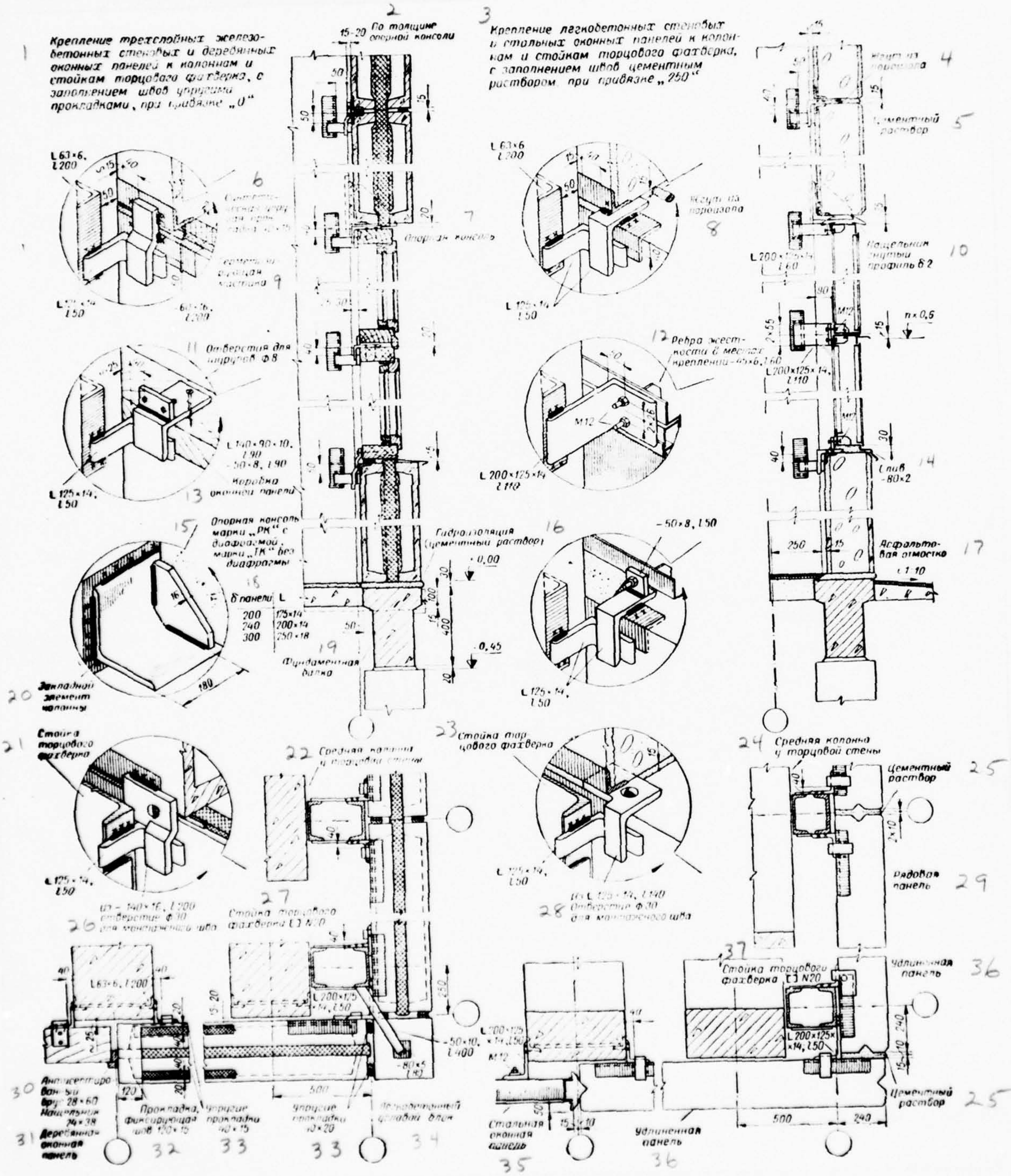
Key: 1 - enclosure/protection of cornice. 2 - wave crest. 3 - transverse lap. 4 - nut ... punched washer .... Pad .... 5 - working stroke along horse. 6 - cut off units. 7 - ridge part. 8 - ... through .... 9 - lug. 10 - transient small part .... 11 - longitudinal lap. 12 - foundation beam .... 13 - ... on the slope through ... on horizontal in crest/peak the second and fifth wave. 14 - lug ... through .... 15 - sheets .... 16 - sheet .... 17 - chute part. 18 - ridge part. 19 - cap/hood made of galvanized iron. 20 - transient small part. 21 - transient small part. 22 - angular part. 23 - ... on the vertical line through ... on horizontal in crest/peak the second and fifth wave. 24 - axle/axis of deformation weld. 25 - end/face of building. 26 - steel window panel. 27 - angular zinc-coated roofing steel. 30 - steel window panel. 31 - sheets the asbestos cement corrugated of the intensive airfoil/profile and part to them according to GOST .... 32 - instruments for fastening on MRTU .... 33 - reinforced-concrete panels for unheated buildings (series .... 34 - hangers. 35 - brackets. 36 - punched washers. 37 - pads .... 38 - adapters. 39 - angular parts. 40 - ridge part .... 41 - isosceles angular part. 42 - small and large .... 43 - isosceles and scalene. 44 - chute part ... it is applied into deformation match-makers. 45 - cement mortar ..... 46 - cross connection of gate frame. 47 - covered end.

Sheet 54. Wall panels (types and assembly diagrams).



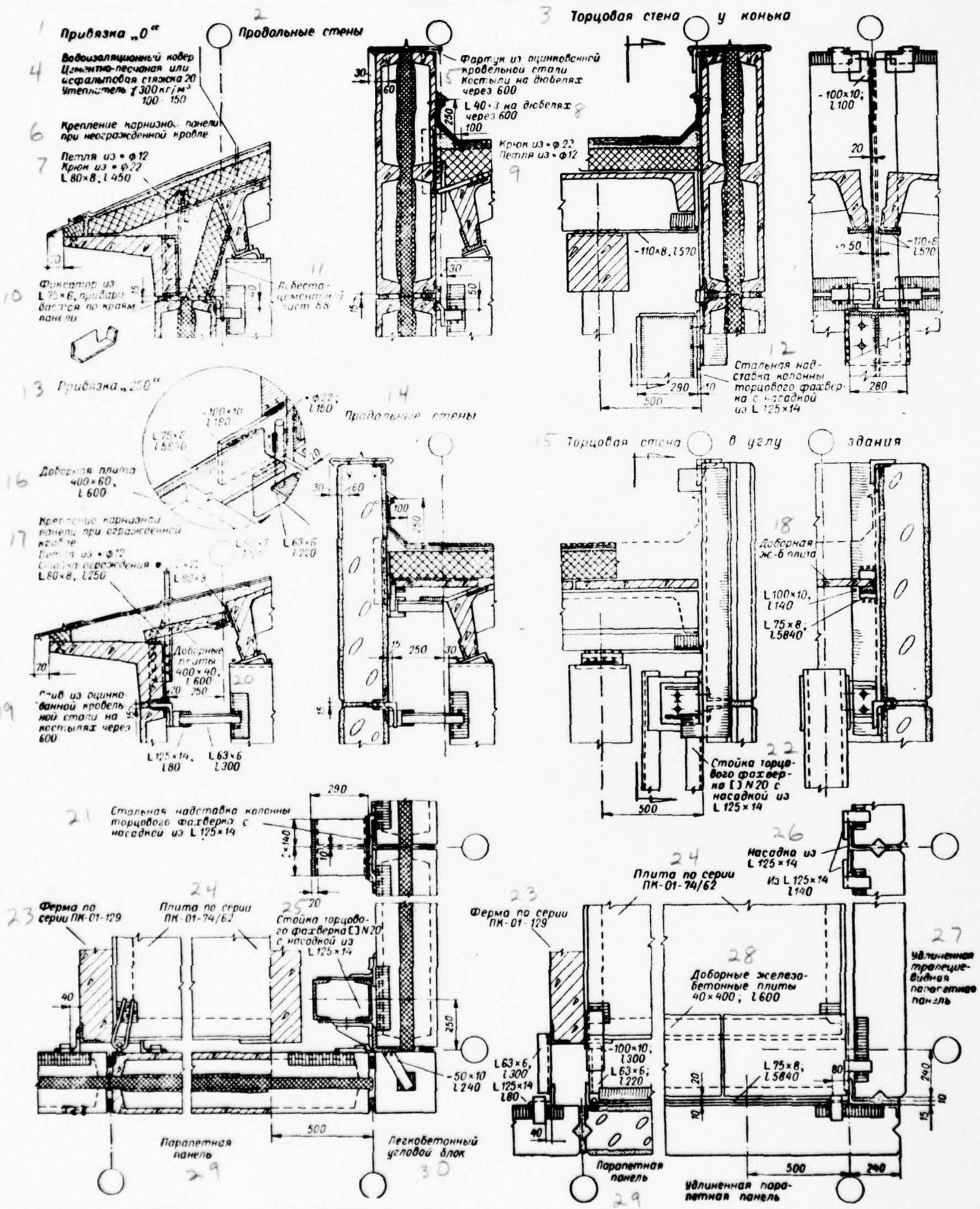
Key: 1 - standardized wall panels with the step/pitch of columns ... reinforced-concrete, also, from cellular/honeycomb and lightweight concrete (series .... 2 - a) keramzit or pearlite concrete ... kg/m³ with facing layers from cement mortar. 3 - loops for lift from .... 4 - b) autoclave cellular concretes ... kg/m³. 5 - trapeziform parapet panel of end-type wall with sloping roofing. 6 - loops for lift from .... 7 - ... with the trimmed flange. 8 - mineral wool plate/slabs ... kg/m³. 9 - ... from below). 10 - light-concrete angular blocks. 11 - series or cross-sonnector panel. 12 - ... angular extended. 13 - series, cross-sonnector or parapet panel. 14 - arrangement of laying cell/elements. 15 - ... panel ... in the extended cross-sonnector panels instead of .... 16 - reinforced-concrete cornice panels. 17 - ... panel ..... 18 - in cross-sonnector panels for fastening of the imposts of steel interlacings according to GOST ..... 19 - ... in all parapet panels for fastening to coating ... only with joining ... in parapet panels for fastening gathering plate/slabs. 20 - ... in all panels for fastening to the framework/body of building. 21 - wooden plugs ... through .... 22 - wooden plugs .... 23 - inside. 24 - fragments of the facades of longitudinal and end-type walls with the assembly diagram of panels. 25 - in the extended panels. 26 - cornice panel, 27 - parapet panel. 28 - bearing bracket of mark/brand RK. 29 - bearing bracket of mark/brand TK. 30 - ... with cornice. 31 - ... with parapet. 32 - nozzle from .... 33 - steel extension. 34 - series

Sheet 55. Wall panels (fastening to columns).



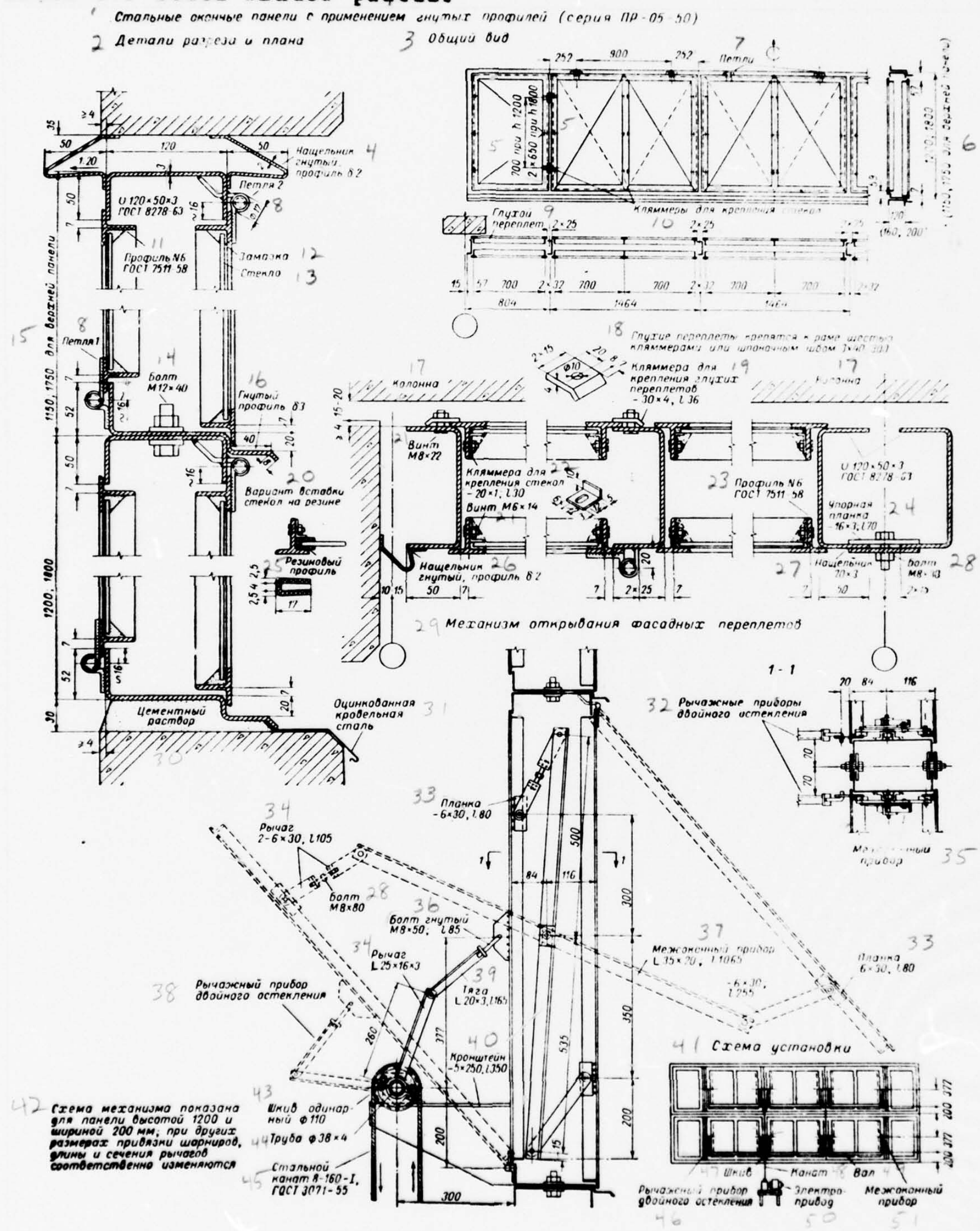
Key: 1 - fastening three-layered reinforced-concrete wall and wooden window panels to columns and struts of end-type framework, with the filling of welds with the cushions, with joining .... 2 - according to the thickness of the bearing bracket. 3 - fastening light-concrete wall and steel window panels to columns and struts of end-type framework, with the filling of welds with cement mortar, with joining .... 4 - band from paraisol. 5 - cement mortar. 6 - synthetic cushion .... 7 - bearing bracket. 8 - band from paraisol. 9 - sealing mastic. 10 - batten the bent airfoil/profile .... 11 - holes for wood screws .... 12 - stiffening ribs in the places of fastenings .... 13 - box of window panel. 14 - drain .... 15 - bearing bracket of brand "RK" with diaphragm, brand "IK" without diaphragm. 16 - waterproofing (cement mortar). 17 - asphalt blind area. 18 - ... panel. 19 - foundation beam. 20 - laying the cell/element of column. 21 - strut of end-type framework. 22 - average column of end-type wall. 23 - strut of end-type framework. 24 - average column of end-type wall. 25 - cement mortar. 26 - from ... hole ... for an assembling weld. 27 - strut of end-type framework .... 28 - from ... hole ... for an assembling weld. 29 - series panel. 30 - disinfected beam ... batten .... 31 - wooden window panel. 32 - packing, which fixes weld .... 33 - cushions ..... 34 - light-concrete angular block. 35 - steel window panel. 36 - extended panel.

Sheet 56. Wall panels (fastening to coating).



Key: 1 - joining .... 2 - longitudinal walls. 3 - end-type wall of horse. 4 - water-insulating carpet is cement-sand or asphalt tie piece ... heater ... kg/m³ .... 5 - apron made of the zinc-coated roofing steel crutches on the dowels through .... 6 - fastening of cornice panel with the unprotected roofing. 7 - loop from ... hanger from .... 8 - ... on the dowels through .... 9 - hanger from ... loop from .... 10 - clamping fixture from ... it is welded on the edges of panel. 11 - asbestos cement sheet .... 12 - steel extension of the column of end-type framework with cap/filling from .... 13 - joining ... ./14 - longitudinal walls. 15 - end-type wall in to the angle of building. 16 - gathering plate/slab .... 17 - fastening of cornice panel with the protected/surrounded roofing loop from ... the strut of enclosure/protection .... 18 - gathering ... plate/slab. 19 - drain made of the zinc-coated roofing steel on the crutches through .... 20 - gathering plate/slabs .... 21 - steel extension of the column of end-type framework with cap/filling from..... 22 - strut of end-type framework ... with cap/filling from ..... 23 - Format on series .... 24 - plate/slab on series .... 25 - strut of end-type framework ... with cap/filling from .... 26 - nozzle from .... 27 - extended trapeziform parapet panel. 28 - gathering reinforced-concrete plate/slabs .... 29 - parapet panel. 30 - light-concrete angular block. 31 - extended parapet panel.

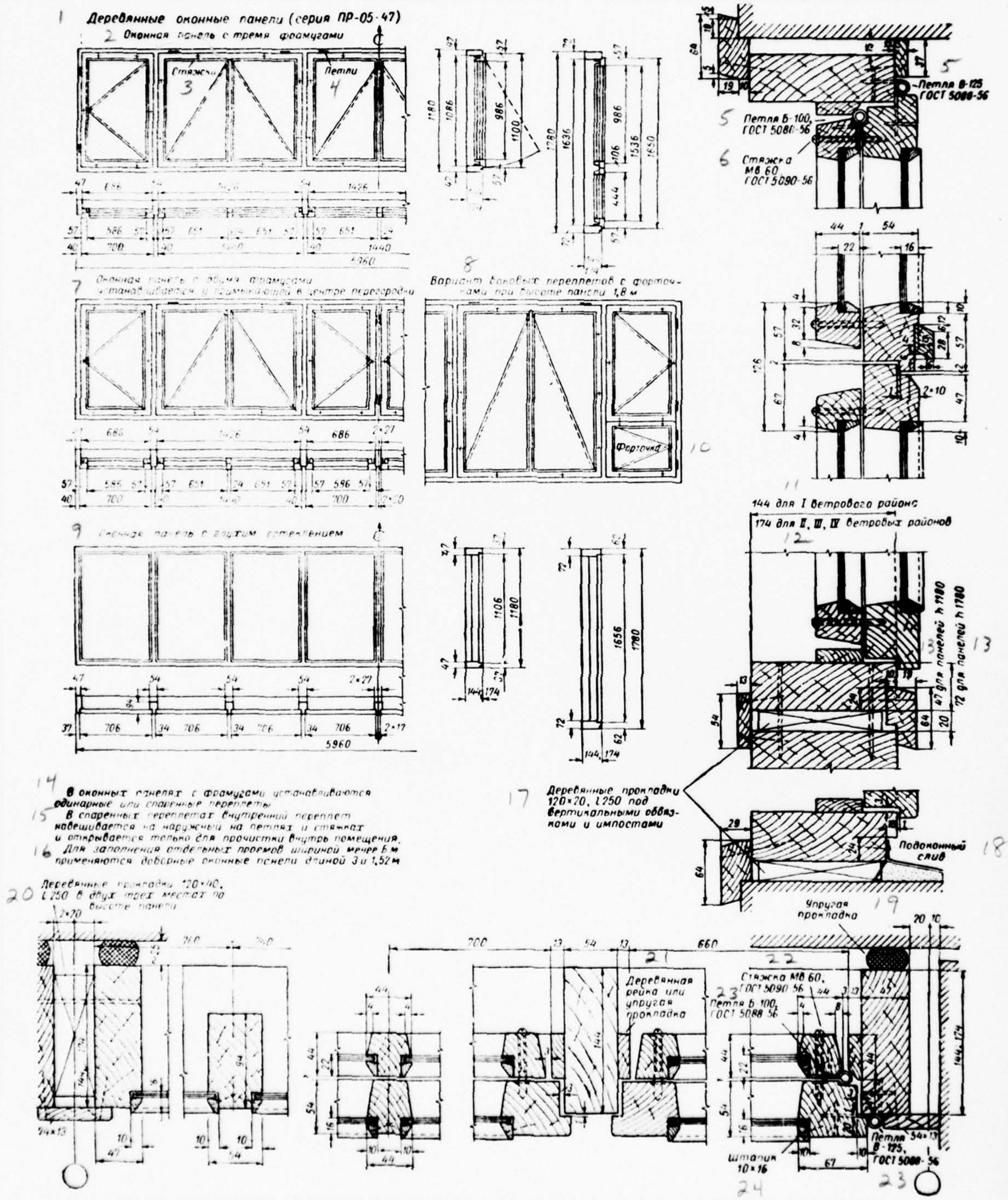
Sheet 57. Steel window panels.



Key: 1 - steel window panels with the application/use of the bent airfoil/profiles (series .... 2 - parts of cut/section and plan/layout. 3 - general view. 4 - batten bent, airfoil/profile .... 5 - ... with .... 6 - ... for an upper panel). 7 - loops. 8 - loop .... 9 - anechoic interlacing. 10 - clinch rivets for fastening of glasses. 11 - airfoil/profile ... of GOST .... 12 - cement. 13 - glass, 14 - bolt .... 15 - ... for an upper panel. 16 - bent airfoil/profile .... 17 - column. 18 - anechoic interlacings they are fastened to frame six clinch rivets or key weld .... 19 - clinch rivet for fastening of anechoic interlacings .... 20 - version of the inset of glasses on rubber. 21 - screw/propeller .... 22 - clinch rivet for fastening of glasses .... 23 - airfoil/profile ... of GOST .... 24 - thrust strip .... 25 - rubber airfoil/profile. 26 - batten bent, airfoil/profile .... 27 - batten .... 28 - bolt ..... 29 - mechanism of the opening of masonry interlacings. 30 - cement mortar. 31 - zinc-coated glazing. 33 - Planck .... 34 - lever .... 35 - between-window instrument. 36 - bolt bent ..... 37 - bwteeen-window instrument .... 38 - lever/crank instrument of double glazing. 39 - thrust/rod .... 40 - bracket .... 41 - installation diagram. 42 - the schematic of mechanism it is shown for a panel with a height of 1200 and by width 200 mm; with other size/dimensions of the joining of hinge joints, lengths and the section/cuts of levers respectively change. 43 - block single ..... 44 - duct .... 45 - steel-strand rope

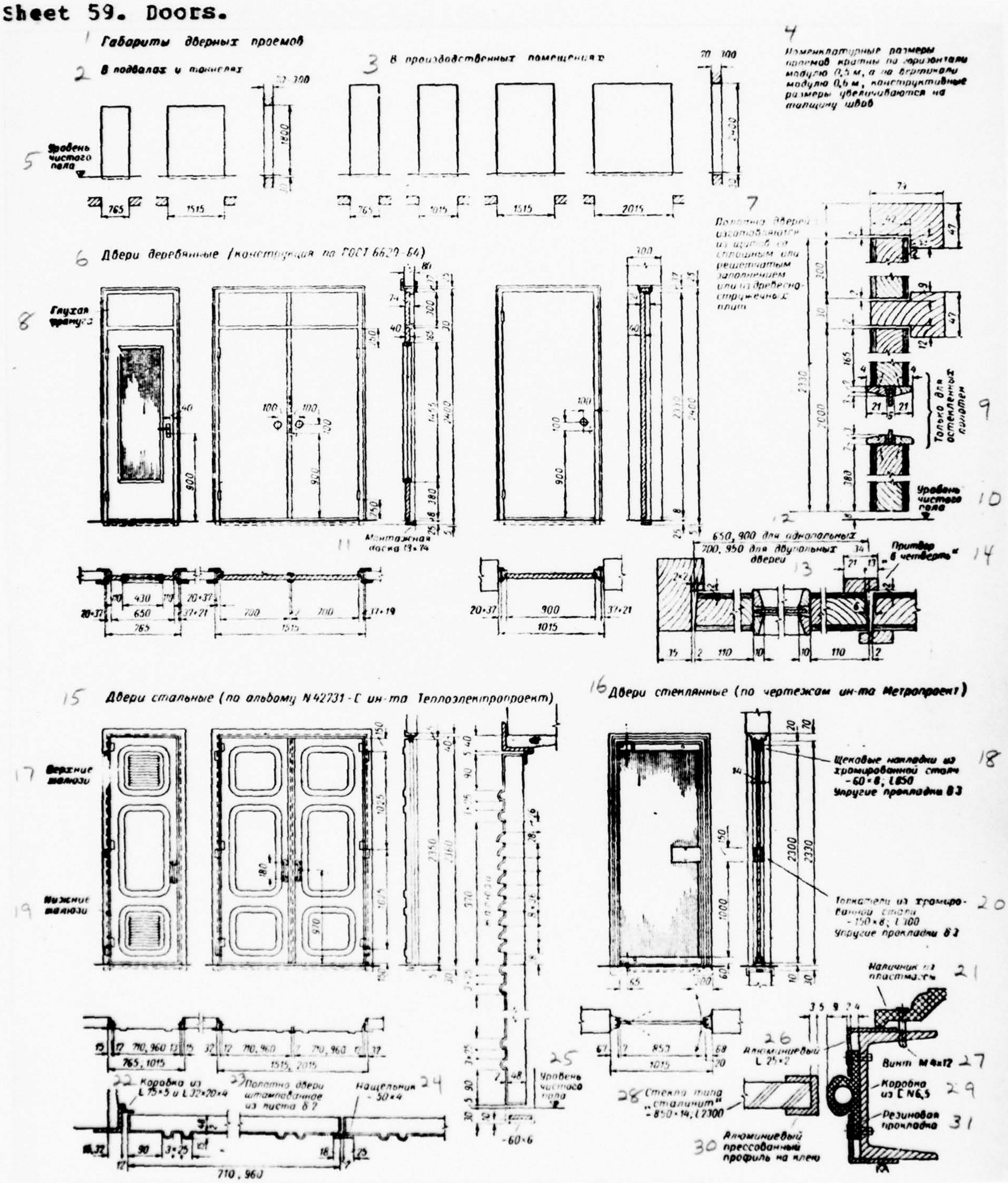
... of GOST .... 46 - lever/crank instrument of double glazing. 47 - block, 48 - cord. 49 - shaft. 50 - electric drive. 51 - between-window instrument.

Sheet 58. Wooden window panels.



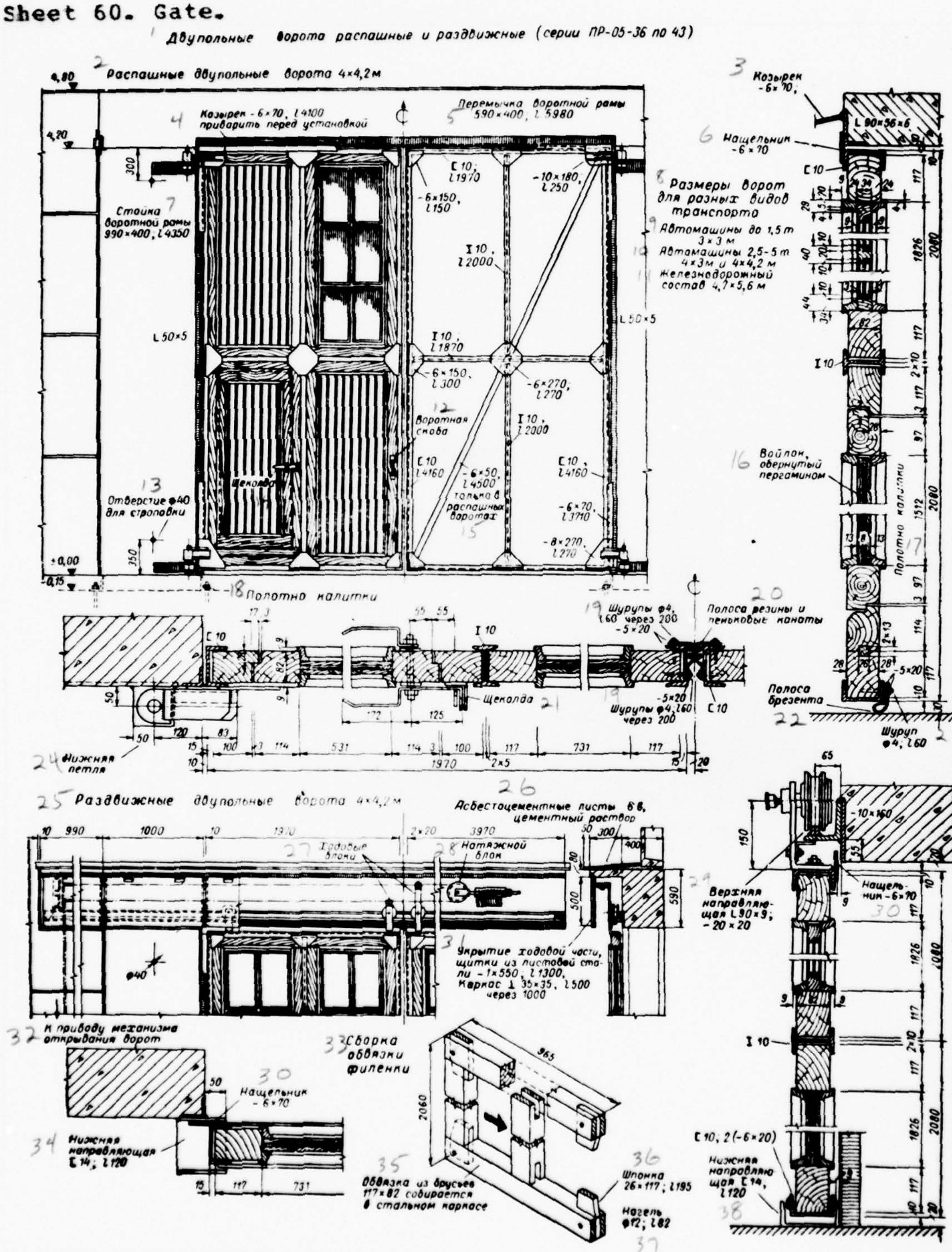
Key: 1 - wooden window panels (series .... 2 - window panel with three transoms. 3 - tie pieces. 4 - loops. 5 - loop ... GOST .... 6 - tie piece ... GOST .... 7 - window panel with two transoms it is establish/installed at the adjacent in center partition. 8 - version of side interlacings with windows at the height of panel .... 9 - window panel with anechoic glazing. 10 - window. 11 - ... for ... a wind region. 12 - ... for ... wind regions. 13 - ... for panels .... 14 - in window panels with transoms are establish/installed the single or paired interlacings. 15 - in the paired interlacings internal interlacing is hung up to external on loops and tie pieces and is open/disclosed only for a cleaning inside location. 16 - for the filling of separate apertures with a width of less ... are applied gathering window panels by length ... and ..... 17 - wood packing ... for vertical braces and imposts. 18 - window stool drain. 19 - cushion. 20 - wood packing ... in two-three places on the height of panel. 21 - wooden rack or cushion. 22 - tie piece .... 23 - loop ... GOST .... 24 - molding/bar ....

Sheet 59. Doors.



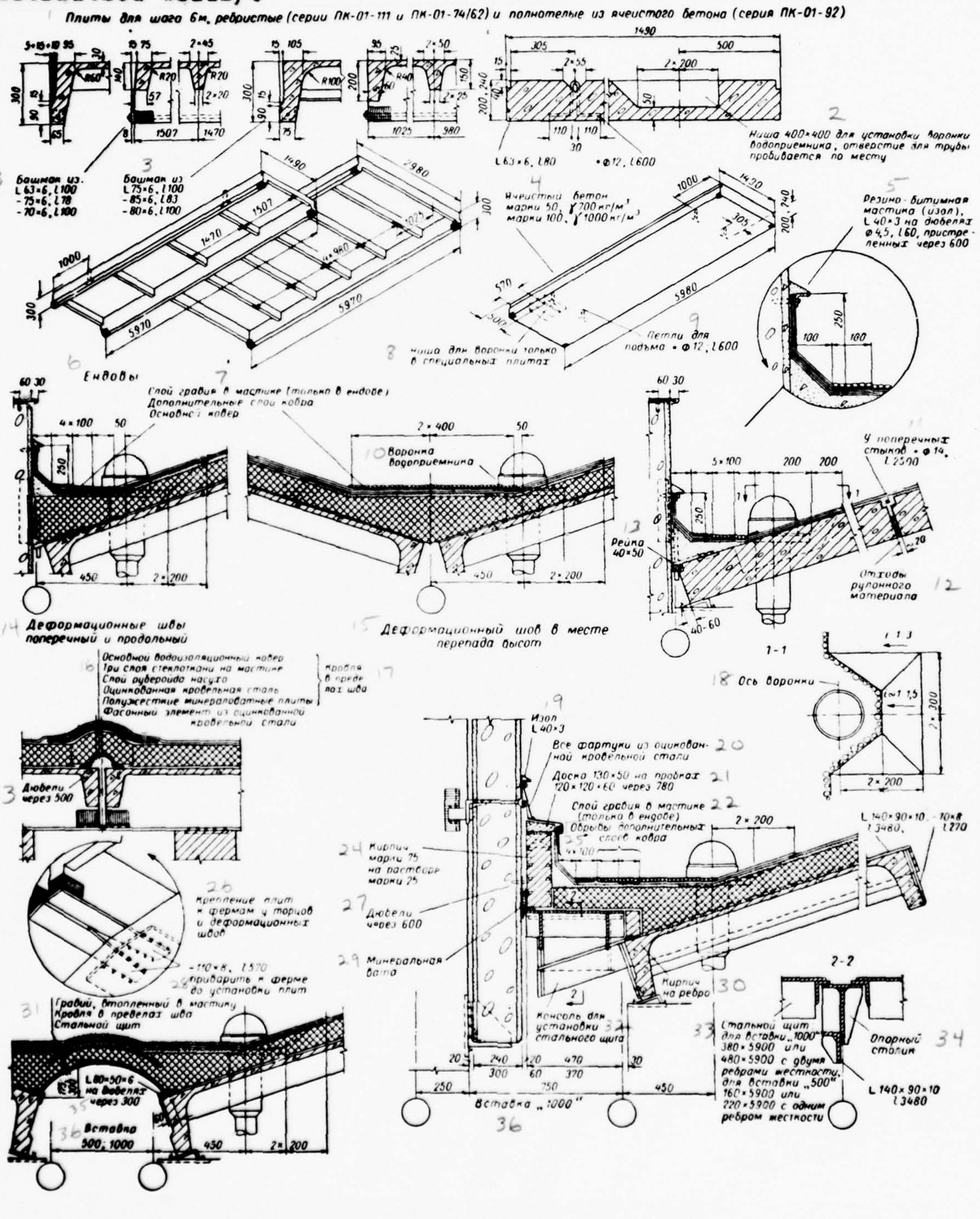
Key: 1 - dimensions of door apertures. 2 - in basements and tunnels. 3 - in production locations. 4 - the standardly designated size/dimensions of apertures are multiple on horizontal to module/modulus ... while in vertical line to module/modulus ... structural/design size/dimensions they increase by weld throat. 5 - level of the pure/clean floor. 6 - doors wooden / construction according to GOST .... 7 - the fabrics of doors they are manufactured from panels with solid or latticed filling or from particle boards. 8 - anechoic transom. 9 - only for the vitrified fabrics. 10 - level of the pure/clean floor. 11 - assembling panel .... 12 - ... for single doors, 13 - ... for double doors. 14 - locking "into fourth". 15 - doors steel (on the album ... of the institute Teploelektroproyekt). 16 - doors glass (on the drawings of the institute Metroproyekt). 17 - upper louvers. 18 - jaw cover plates made of chrome-plated steel ... the cushions .... 19 - lower louvers. 20 - pushers made of chrome-plated steel ... the cushions .... 21 - cover plate from plastic. 22 - box from ... and .... 23 - fabric of door die-forge/stamped from sheet .... 24 - batten .... 25 - level of the pure/clean floor. 26 - aluminum .... 27 - screw/propeller .... 28 - glasses of the type "stalinite" .... 29 - box from .... 30 - aluminum pressed airfoil/profile on to glue. 31 - rubber packing.

Sheet 60. Gate.



Key: 1 - Double gate unfolding and extension (series ... on .... 2 - unfolding double gate .... 3 - deflector .... 4 - deflector ... to weld before the installation. 5 - cross connection of gate frame ..... 6 - batten .... 7 - strut of gate frame .... 8 - size/dimensions winch for the different types of transport. 9 - motor vehicles to ... t .... 10 - motor vehicles ... t ... and .... 11 - train .... 12 - gate bracket. 13 - hole ... for slinging. 14 - latch. 15 - ... only in unfolding winches. 16 - felt, wrapped up by pergamyn. 17 - fabric of wicket. 18 - fabric of wicket. 19 - wood screws ... through .... 20 - band are carved hemp ropes. 21 - latch. 22 - band of tarpaulin. 23 - wood screw .... 24 - lower loop. 25 - extension double gates .... 26 - asbestos cement sheets ... cement mortar. 27 - running blocks. 28 - tension pulley block. 29 - upper guide .... 30 - batten .... 31 - shelter of undercarriage, panels made of sheet steel ... framework/body ... through .... 32 - to the drive of the mechanism of opening winch. 33 - assembly of the brace of panel. 34 - lower guide .... 35 - brace from bars ... it is assembled in steel framework/body. 36 - key .... 37 - pin. 38 - lower guide ....

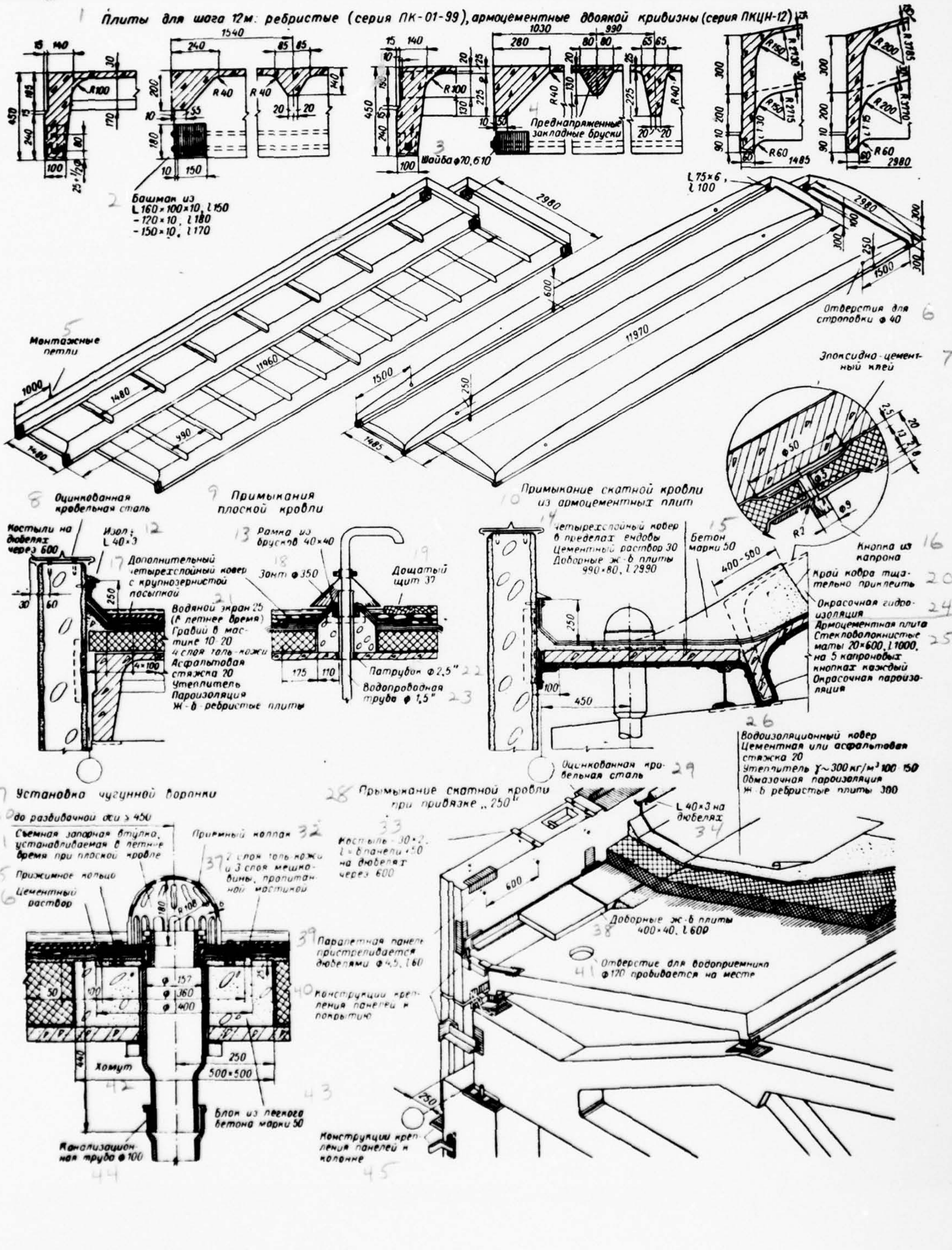
Sheet 61. Coatings (plate/slats for step/pitch 6 m, roof valleys, deformation welds).



Key: 1 - plate/slabs for a step/pitch ... finned (series ... and ... and fat from cellular concrete (series .... 2 - niche ... for the installation of the funnel of water intake; hole for a duct is punched on place. 3 - shoe from .... 4 - cellular concrete of mark/brand ... kg/m² of mark/brand ... kg/m³. 5 - rubber-asphalt mastic (Izol), ... on dowels ... shot through .... 6 - roof valleys. 7 - layer of gravel in mastic (only in roof valley) the additional layers of carpet basic carpet. 8 - niche for a funnel only in special plate/slabs. 9 - loops for lift .... 10 - funnel of water intake. 11 - of transverse it is butting .... 12 - departure/withdrawals of roll material. 13 - rack .... 14 - deformation welds transverse and longitudinal. 15 - deformation weld in the place of a jump/drop in the heights. 16 - basic water-insulating carpet three layers of glass cloth on mastic the layer of rubercid the dry zinc-coated roofing steel semirigid mineral wool plate/slabs shaped cell/element made of the zinc-coated roofing steel. 17 - roofing within the limits of weld. 18 - axle/axis of funnel. 19 - Izol .... 20 - all aprons made of the zinc-coated roofing steel. 21 - panel ... on plugs ... through .... 22 - layer of gravel in mastic (only in roof valley). 23 - dowels through .... 24 - brick of mark/brand ... in the solution/opening of mark/brand ..... 25 - breaks of the additional layers of carpet. 26 - fastening plate/slabs to farm/trusses of end/faces and deformation welds. 27 - slag cotton. 30 - brick to

fin/edge. 31 - gravel, heated into mastic roofing within the limits of weld steel panel. 32. Arm for installation of steel panel. 33 - steel panel; for an inset ... or ... with two stiffening ribs; for an inset ... or ... with one stiffening rib. 34 - supporting/reference stand. 35 - ... on the dowels through .... 36 - inset ....

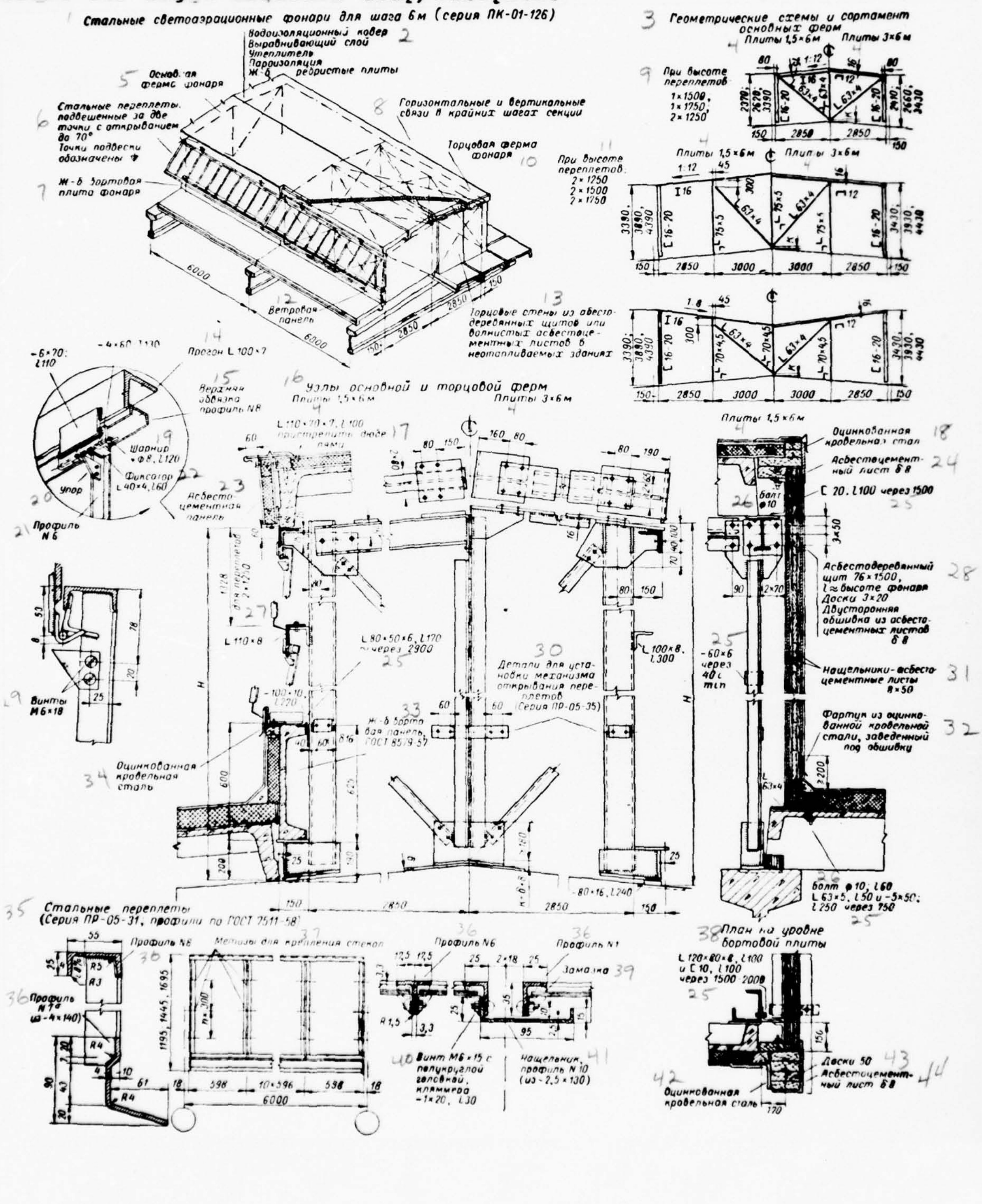
Sheet 62. Coatings (plate/slabs for step/pitch 12 m, contiguity to walls).



Key: 1 - plate/slabs for a step/pitch ... finned (series ... reinforced-cement of double curvature (series .... 2 - shoe from .... 3 - washer .... 4 - prestressed laying bars. 5 - assembling loops. 6 - holes for slinging .... 7 - epoxy-cement glue. 8 - zinc-coated roofing steel. 9 - contiguities of flat/plane roofing. 10 - contiguity of sloping roofing from reinforced-cement plate/slabs. 11 - crutches on the dowels through .... 12 - Izol .... 13 - framework from bars .... 14 - four-layer carpet within the limits of valley. Cement mortar ... gathering ... plate/slabs .... 15 - concrete of mark/brand .... 16 - knob/button from capron. 17 - additional four-layer carpet with coarse-grained sprinkling. 18 - hood .... 19 - plank shield .... 20 - the edge of carpet it is thorough to stick. 21 - water screen ... (in summer). Gravel in the mastic ... of the layer of the unsanded tar paper asphalt tie piece ... heater ... steam insulation ... - ribbed slabs. 22 - branch connection .... 23 - water pipe .... 24 - coloring waterproofing. 25 - reinforced-cement plate/slab fiberglass matte finishes ... on ... kapron knob/buttons each ... coloring steam insulation. 26 - water-insulating carpet cement or asphalt tie piece ... heater ..., kg/m³ ... is coating steam insulation ... ribbed slabs .... 27 - installation of cast iron funnel. 28 - contiguity of sloping roofing with joining .... 29 - zinc-coated roofing steel. 30 - to center line .... 31 - removable locking bushing, adjustable in summer with flat/plane roofing. 32 -

receiving cap/hood. 33 - crutch ... of panel ... on the dowels through .... 34 - ... on dowels. 35 - clamping ring. 36 - cement mortar. 37 - ... layer of unsanded tar paper and ... layer of the sacking, impregnated with mastic. 38 - gathering ... plate/slabs .... 39 - parapet panel it is shot by dowels .... 40 - constructions of fastening panels to coating. 41 - hole for a water intake ... it is punched on the spot. 42 - clamp. 43 - block from lightweight concrete of mark/brand .... 44 - sewer .... 45 - constructions of fastening panels to column.

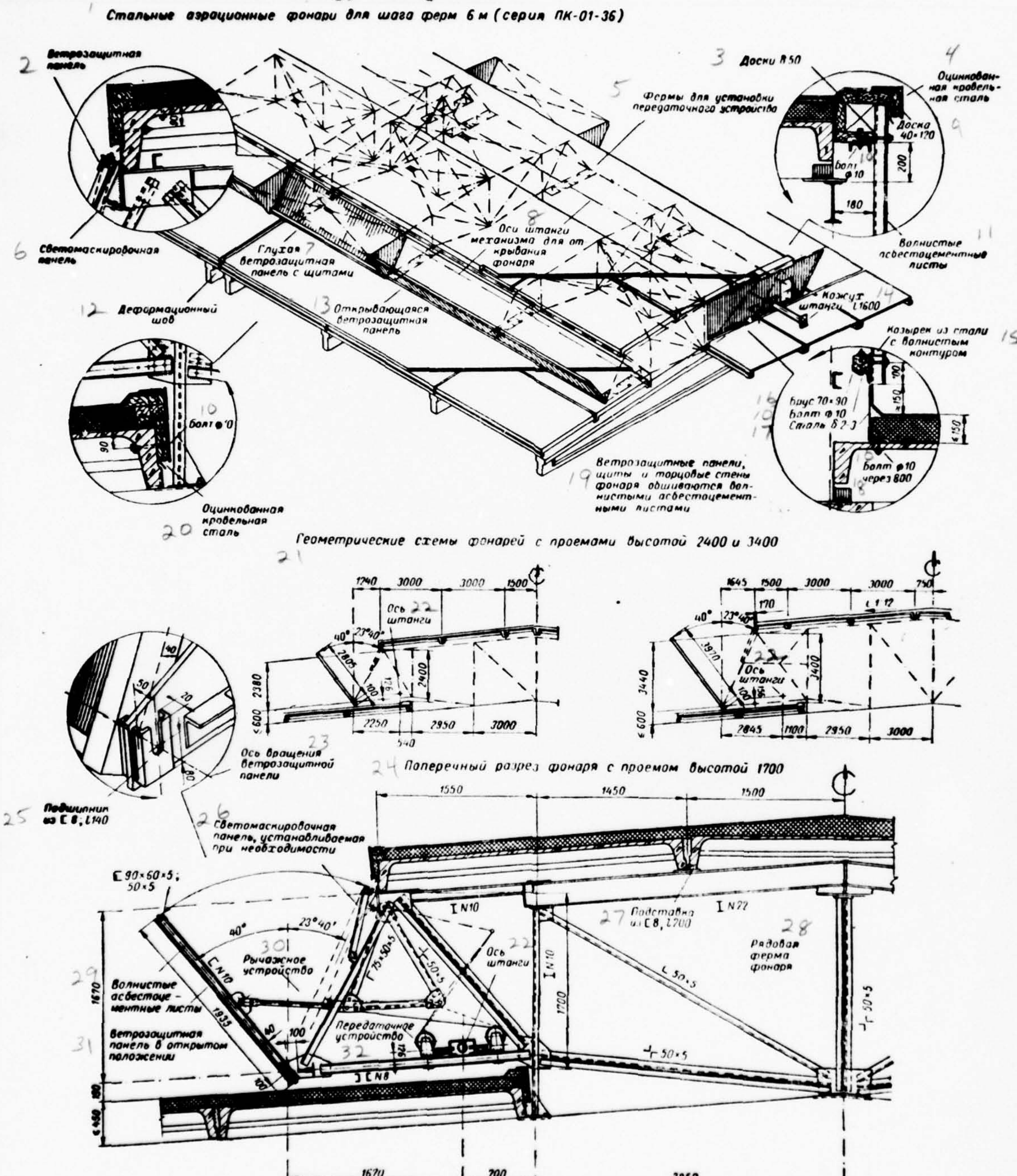
Sheet 63. Light-aeration lamp/canopies.



Key: 1 - steel light-aeration lamp/canopies for a step/pitch ... (series .... 2 - water-insulating carpet. leveling layer. heater. steam insulation ... ribbed slabs. 3 - geometric diagrams and assortment of basic farm/trusses. 4 - plate/slabs .... 5 - basic farm/truss of lamp/canopy. 6 - the steel interlacings, suspend/hung for two points with opening to ... the point of suspension are designated .... 7 - ... the on-board plate/slab of lamp/canopy. 8 - horizontal and vertical communication/connections in the extreme step/pitches of section. 9 - at the height of interlacings .... 10 - end-type farm/truss of lamp/canopy. 11 - at the height of interlacings .... 12 - wind panel. 13 - end-type walls from abestos-wooden panels or corrugated asbestos cement sheets in unheated buildings. 14 - drive/girder .... 15 - upper brace is airfoil/profile ..... 16 - units basic and end-type of farm/trusses. 17 - ... to shoot by dowels. 18 - the zinc-coated roofing stopped. 19 - hinge joint .... 20 - detent. 21 - airfoil/profile .... 22 - clamping fixture .... 23 - asbestos cement panel. 24 - asbestos cement sheet .... 25 - ... through .... 26 - bolt .... 27 - ... for interlacings .... 28 - asbestos-wooden panel ... to the height of the lamp/canopy of panel ... bilateral sheathing/skin from asbestos cement sheets ..... 29 - screw/propellers .... 30 - parts for the installation of the mechanism of the opening of interlacings (series .... 31 - gathering-asbestos cement sheets .... 32 - apron made of

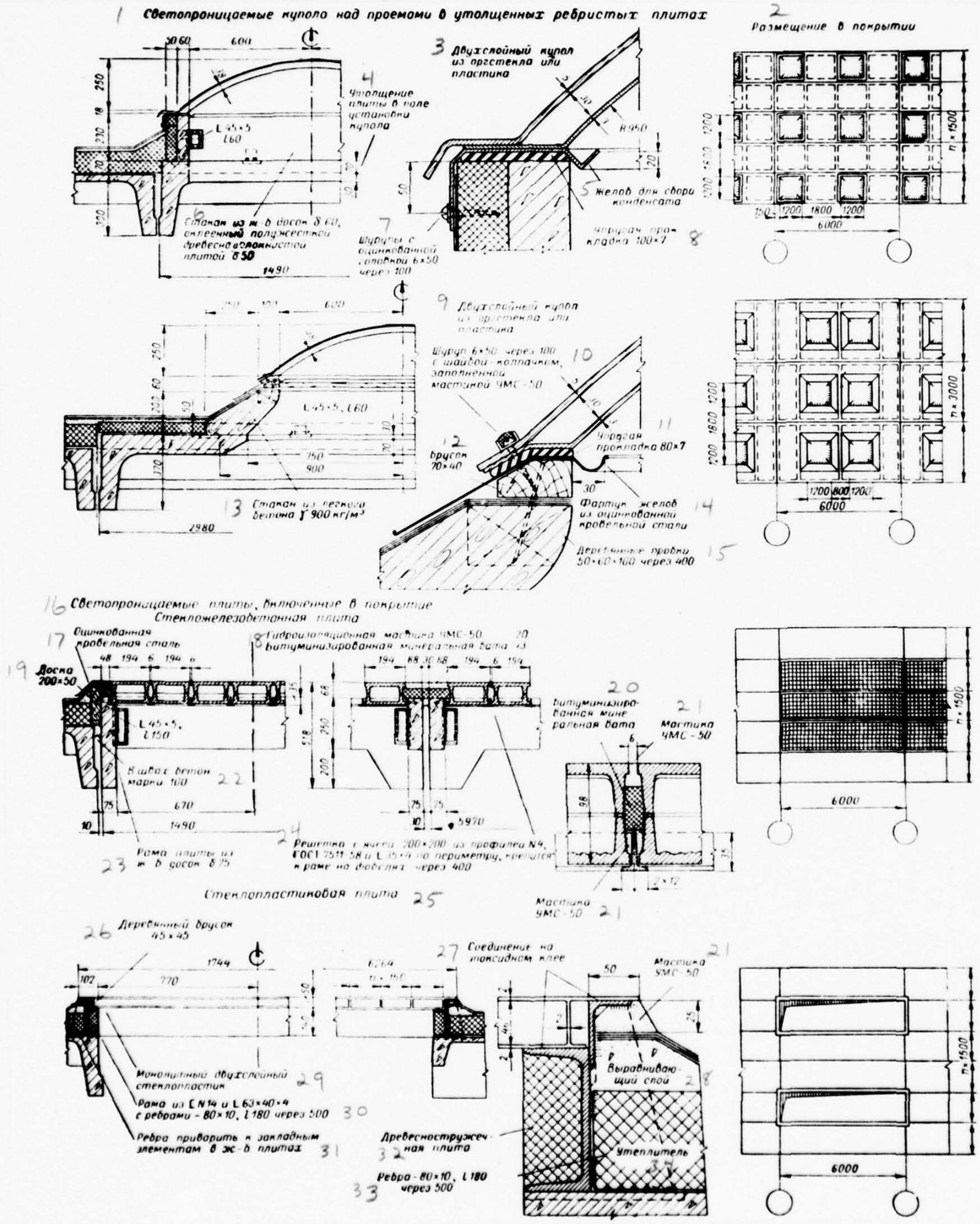
the zinc-coated roofing steel, brought for sheathing/skin. 33 - ... side panel GOST .... 34 - zinc-coated roofing steel. 35 - steel interlacings (series ... airfoil/profiles according to GOST .... 36 - airfoil/profile .... 37 - ironware for fastening of glasses. 38 - plan/layout at the level of on-board plate/slat. 39 - cement. 40 - screw/propeller ... with cup head, clinch rivet .... 41 - gathering, airfoil/profile ... (from .... 42 - zinc-coated roofing steel. 43 - panels .... 44 - asbestos cement sheet ....

Sheet 64. Aeration lamp/cancpies.



Key: 1 - steel aeration lamp/canopies for the step/pitch of farm/trusses ... (series .... 2 - windshield panel. 3 - panels .... 4 - zinc-coated roofing steel. 5 - farm/trusses for the setting up of transmission device. 6 - blackout panel. 7 - anechoic windshield panel with panels. 8 - axle/axes of the rod of mechanism for the opening of lamp/canopy. 9 - panel .... 10 - bolt .... 11 - corrugated asbestos cement sheets. 12 - deformation weld. 13 - open/disclosed windshield panel. 14 - jacket of rod .... 15 - deflector made of steel with corrugated outline/contour. 16 - beam .... 17 - steel .... 18 - through .... 19 - windshield panels, panels and the end-type walls of lamp/canopy they are face/trimmed by corrugated asbestos cement sheets. 20 - zinc-coated roofing steel. 21 - geometric diagrams of lamp/canopies with apertures by height ... and .... 22 - axle/axis of rod. 23 - rotational axis of windshield panel. 24 - cross section of lamp/canopy with aperture delay time .... 25 - bearing from .... 26 - blackout panel, adjustable if necessary. 27 - support/socket from .... 28 - series farm/truss of lamp/canopy. 29 - corrugated asbestos cement sheets. 30 - lever/crank device. 31 - windshield panel in the open position. 32 - transmission device.

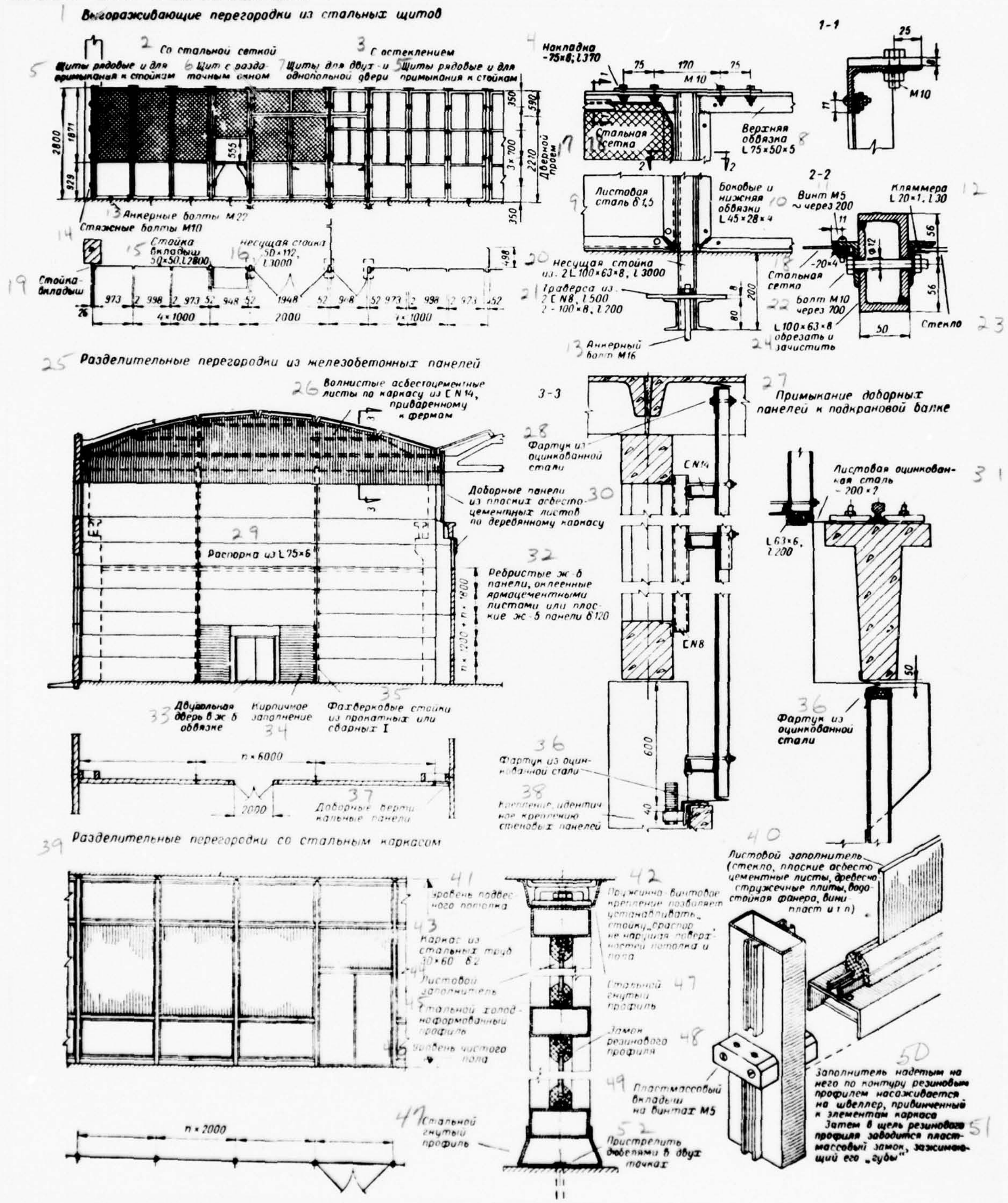
Sheet 65. Light lamp/canopies



Key: 1 - translucent cupolas above apertures in the thickened ribbed slabs. 2 - arrangement/position in coating. 3 - two-layered cupola from fiberglass or plastic. 4 - thickening of plate/slab in the field of the setting up of cupola. 5 - groove for the collection of condensate. 6 - beaker/sleeve from ... panels ... that pasted over semirigid is wood by fiber plate .... 7 - wood screws with the zinc-coated knob/cap ... through .... 8 - cushion .... 9 - two-layered cupola from fiberglass or plastic. 10 - wood screw .... through ... with washer-cap/hood, filled by the mastic UMS .... 11 - cushion .... 12 - bar .... 13 - beaker/sleeve from lightweight concrete ... kg/m³. 14 - apron-groove made of the zinc-coated roofing steel. 15 - wooden plugs ... through .... 16 - translucent plate/slabs, connected in coating glass-reinforced-concrete plate/slab. 17 - zinc-coated roofing steel. 18 - moisture-proof mastic ... the bituminized slag cotton. 19 - panel .... 20 - bituminized slag cotton. 21 - mastic .... 22 - in welds concrete of mark/brand .... 23 - frame of plate/slab from ... panels .... 24 - grate from cells ... from the airfoil/profiles ... GOST ... and ... on perimeter, it is fastened to frame to the dowels through .... 25 - glass-plastic plate/slab. 26 - wooden bar. 27 - connection on epoxy glue. 28 - leveling layer. 29 - monolithic two-layered glass-fiber-reinforced plastic. 30 - frame from ... and ... with fin/edges ... through .... 31 - fin/edges to weld to laying

cell/elements in ... plate/slabs. 32 - particle board. 33 - fin/edges ... through .... 34 - heater.

Sheet 66. Partitions.

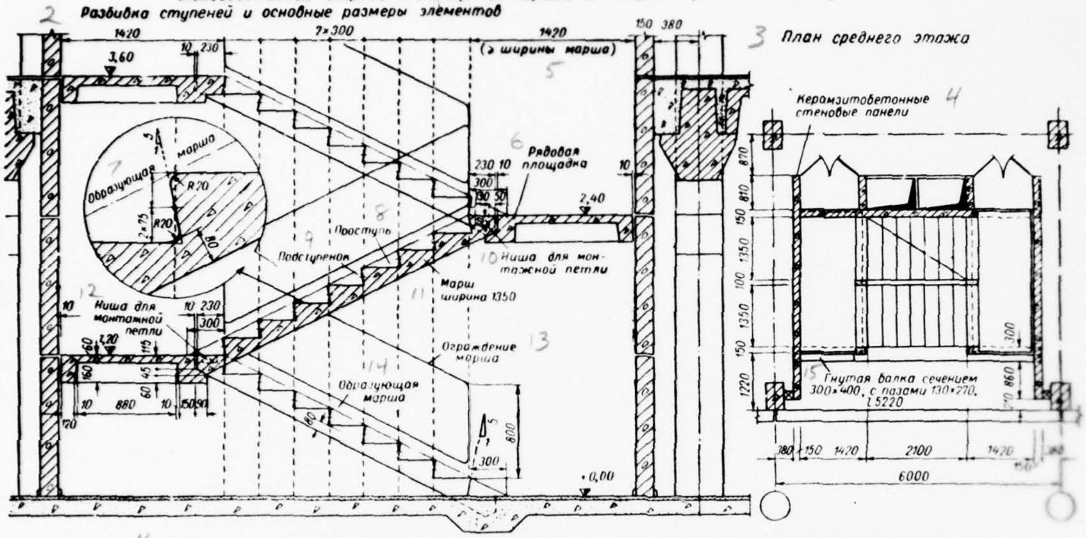


Key: 1 - fencing off partitions from steel panels. 2 - with steel mesh. 3 - with glazing. 4 - cover plate .... 5 - panels series and for contiguity to struts. 6 - panel with distributing window. 7 - panels for double and single door. 8 - upper brace. 9 - sheet steel .... 10 - side and lower braces .... 11 - screw/propeller ... through .... 12 - clinch rivet .... 13 - anchor bolts .... 14 - tightening bolts .... 15 - strut is insert/bushing .... 16 - carrying strut .... 17 - door aperture. 18 - steel mesh. 19 - strut is insert/bushing. 20 - carrying strut from: .... 21 - traverse from: .... 22 - bolt ... through .... 23 - glass. 24 - ... to trim and to clean. 25 - partitions from reinforced-concrete panels. 26 - corrugated asbestos cement sheets on framework/body from ... welded to farm/trusses. 27 - contiguity of gathering panels to the crane beam. 28 - apron made of galvanized iron. 29 - spacer from .... 30 - gathering panels from flat/plane asbestos cement sheets on lumber. 31 - sheet galvanized iron. 32 - finned ... panels, pasted over by reinforced-cement sheets or flat/plane ... panels .... 33 - bipartite door in ... brace. 34 - brick filling. 35 - frame struts from rolling or welded .... 36 - apron made of galvanized iron. 37 - gathering vertical panels. 38 - fastening, identical to fastening wall panels. 39 - partitions with steel framework/body. 40 - laminated filler (glass, flat/plane asbestos cement sheets, particle boards, hydrostable plywood, polyvinyl chloride plastic, etc.). 41 - level of suspension ceiling.

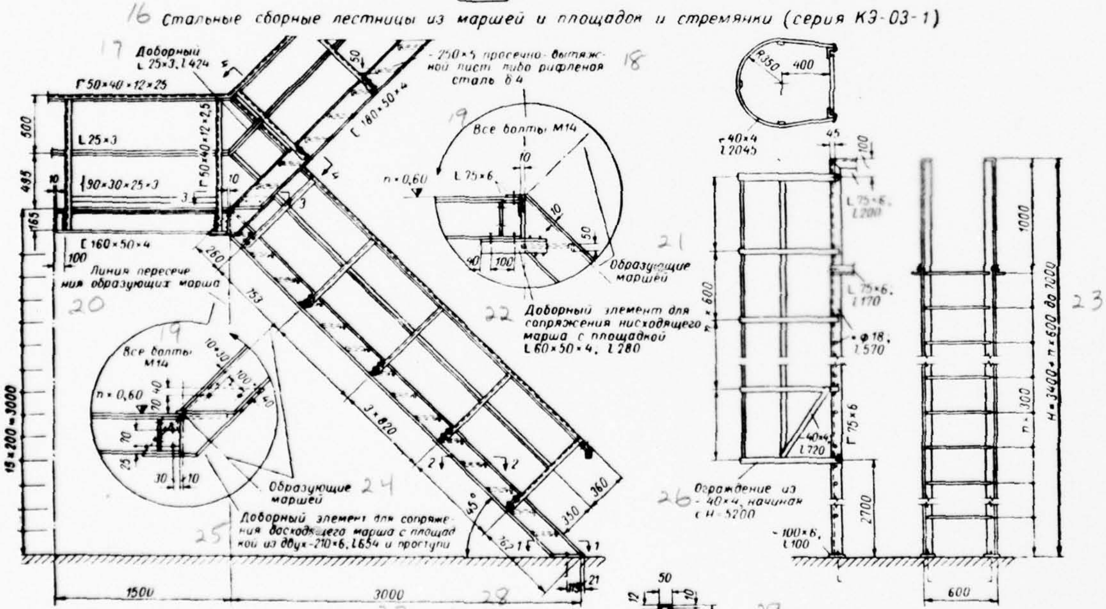
42 - spring-spiral fastening it makes it possible to establish/install the strut "vraspcr" without disturbing the surfaces of ceiling and sex/floor. 43 - framework/body from steel tubes .... 44 - laminated filler. 45 - steel cold-formed airfoil/profile. 46 - level of the pure/clean floor. 47 - steel bent airfoil/profile. 48 - lock of rubber airfoil/profile. 49 - plastic insert/bushing on screw/propellers .... 50 - filler by the put on to it on outline/contour rubber airfoil/profile it is mount/fited the channel bar, screwed down to the cell/elements of framework/body. 51 - then into the slot of rubber airfoil/profile is cranked up the plastic lock, which clamps its "jaws". 52 - to shoot by dowels at two points.

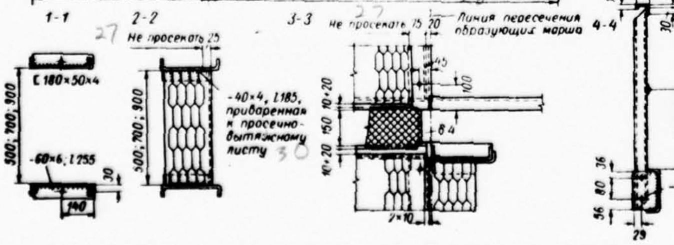
Sheet 67. Staircases.

Железобетонные сборные лестницы из маршей и площадок (серия ИИ 20-9)



Стальные сборные лестницы из маршей и площадок и стремянки (серия КЭ-03-1)



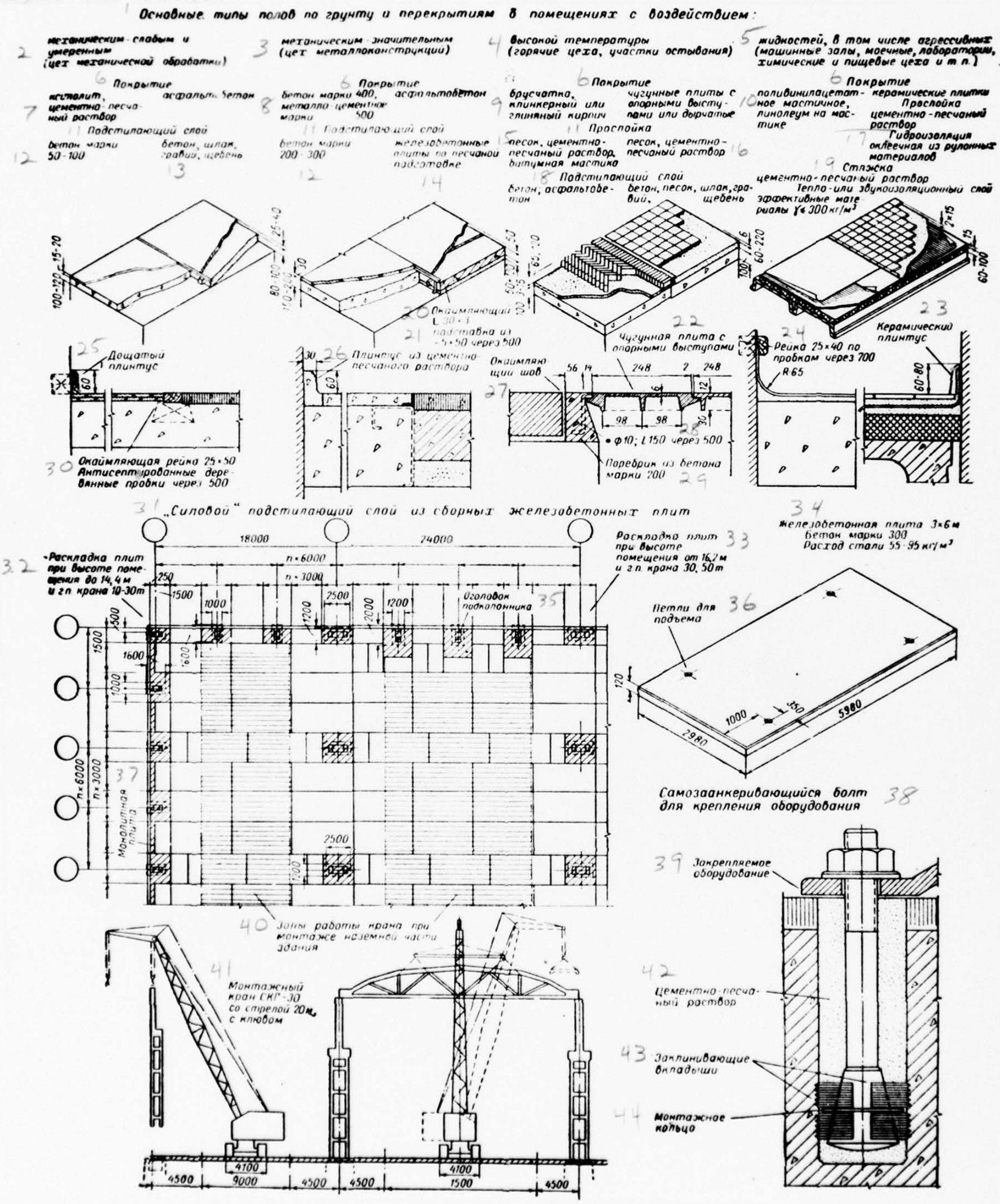


Основные параметры стальных лестниц

Основные параметры \ Угол наклона	45°	60°	90°
Ширина марша, мм	600 800 1000	600 800	600
Подъем марша, мм	n×600 до 4200	n×600 до 6000	2400+ +n×600 до 6000
Подъем ступени, мм	200	300	300

Key: 1 - reinforced-concrete composite staircases from marchs and area/sites (series .... 2 - laying out of step/stages and basic dimensions of cell/elements. 3 - plan/layout of the middle story. 4 - keramzit-concrete wall panels. 5 - (... the width of march). 6 - series area/site. 7 - forming march. 8 - tread. 9 - riser. 10 - niche for an assembling loop. 11 - march is width .... 12 - niche for an assembling loop. 13 - enclosure/protection of march. 14 - forming march. 15 - bent beam by section/cut.... with groove/slots .... 16 - steel composite staircases from marchs and area/sites and u-bolt (series .... 17 - gathering .... 18 - ... the cut and drawn sheet or riffled iron .... 19 - all bolts .... 20 - intersection of generatrices of march. 21 - forming marchs. 22 - gathering cell/element for the coupling of the descending march with area/site .... 23 - ... to .... 24 - forming marchs. 25 - gathering cell/element for the coupling of the ascending march with area/site of two ... pass through. 26 - enclosure/protection from ... beginning with .... 27 - not to cut. 28 - intersection of generatrices of march. 29 - basic parameters of steel staircases. 30 -.... welded to the cut and drawn sheet. 31 - slope angle. 32 - basic parameters. 33 - width of march, mm. 34 - lift of march, mm. 35 - lift of step/stage, mm.

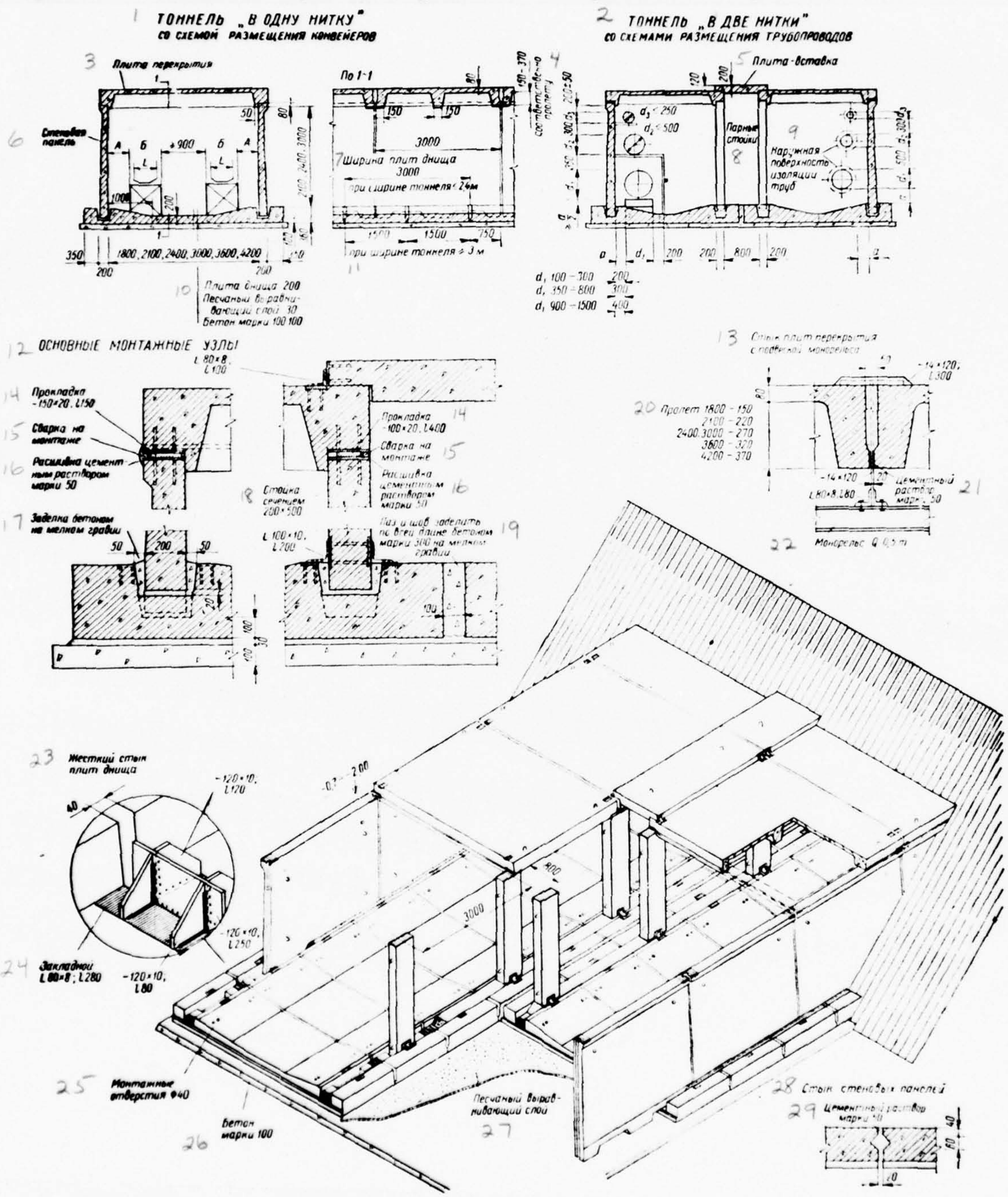
Sheet 68. Floors



Key: 1 - basic types of sex/floors cn scil and cverlaps ... locations with effect. 2 - mechanical-weak and mcderated (shop of machining). 3 - mechanical-considerable (shop of metal structures). 4 - high temperature (metallurgical plants, the secticns of cooling). 5 - liquids, including cf aggressive (machine rccms, washing, laboratories, chemical and food shcps, etc.). 6 - coating. 7 - isoclit, cement-sand mortar. asphalt concrete. 8 - concrete of mark/brand ... metal-cement of mark/brand ... asphalt concrete. 9 - blcck, clinker or clay brick. Cast iron plate/slabs with supporting/reference projections or perforated. 10 - polyvinyl acetate mastic, linoleum on mastic. ceramic slabs. Layer is cement-sand mortar. 11 - underlying layer. 12- concrete of mark/brand .... 13 - concrete, slag, gravel, crushed stone. 14 - reinforced-concrete plate/slabs on sand preparation. 15 - sand, cement-sand mortar, bitumastic. 16 - sand, cement-sand mortar. 17 - waterproofing is backing from roll materials. 18 - underlying layer. concrete; asphalt concrete. concrete, sand, slag is gravel, crushed stone, 19 - tie piece is cement-sand mortar. Heat or sound-insulating layer effective materials ... kg/m³. 20 - bordering .... 21 - support/socket from ... through .... 22 - cast iron plate/slab with supporting/reference projections. 23 - ceramic plinth. 24 - rack ... on the plugs through .... 25 - made of planks plinth. 26 - plinth from cement-sand solution/opening. 27 - bordering weld. 28 - ...

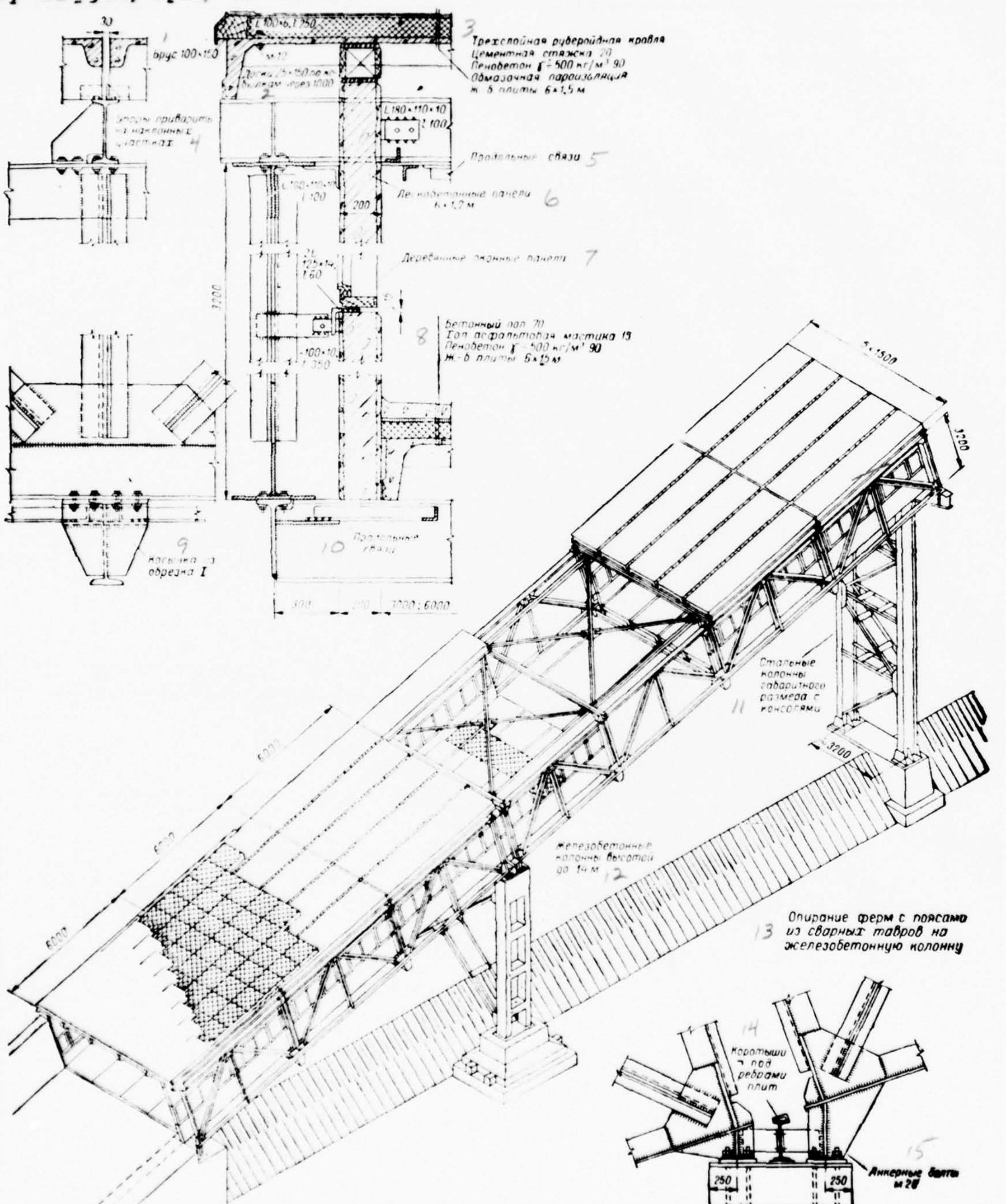
through .... 29 - border from concrete of mark/brand .... 30 - bordering rack .... Disinfected wooden plugs through .... 31 - "power" underlying layer from composite reinforced-concrete plate/slabs. 32 - apportionment of plate/slabs at the height of location to ... and g.p. tap/crane .... 33 - apportionment of plate/slabs at the height of location from ... and ... tap/crane .... 34 - reinforced-concrete plate/slab ... concrete of mark/brand ... the consumption of steel ... kg/m³. 35 - end of base. 36 - loops for lift. 37 - monolithic plate/slab. 38 - self-anchored bolt for fastening of equipment. 39 - fastened equipment. 40 - zones of the work of tap/crane during the assembly of the ground-based part of the building. 41 - erecting crane ... with arrow/pointer ... with beak. 42 - cement-sand mortar. 43 - wedging insert/bushings. 44 - mounting ring.

Sheet 69. Tunnels from the precast reinforced concrete.



Key: 1 - tunnel "into one thread" with the diagram of the arrangement/position of conveyors. 2 - tunnel "into two threads" with the diagrams of the arrangement/position of conduit/manifolds. 3 - plate/slab of overlap. 4 - with respect to flight/span. 5 - plate/slab-inset. 6 - wall panel. 7 - width of the plate/slabs of bottom ... with the width of tunnel .... 8 - conjugate struts. 9 - external surface of tubular insulation. 10 - plate/slab of bottom ... the sand leveling layer ... concrete of mark/brand .... 11 - with the width of tunnel .... 12 - basic assembling units. 13 - joint of the plate/slabs of overlap with the suspension of monorail. 14 - packing .... 15 - welding on assembly. 16 - pointing by cement mortar of mark/brand .... 17 - framing by concrete on small gravel. 18 - strut by section/cut .... 19 - pass and weld to seal over entire length by concrete of mark/brand ... on small gravel. 20 - flight/span .... 21 - cement mortar of mark/brand ..... 22 - monorail ... t. 23 - rigid joint of the plate/slabs of bottom. 24 - laying .... 25 - open holes .... 26 - concrete of mark/brand .... 27 - sand leveling layer. 28 - joint of wall panels. 29 - cement mortar of mark/brand.

Sheet 70. Gallery on the steel, arranged/located outside farm/trusses by flight/span to 30 m.



Key: 1 - beam .... 2 - panels ... on the bridges through .... 3 - three-layered rubercid roofing cement tie piece ... cellular concrete ... kg/m³ ... is coating steam insulation ... of plate/slab .... 4 - detents to weld on inclined sections. 5 - longitudinal communication/connections. 6 - light-concrete panels .... 7 - wooden window panels. 8 - concrete sex/floor ... course is the mastic asphalt ... cellular concrete ... kg/m³ ... of plate/slab .... 9 - knee plate from trimming. 10 - longitudinal communication/connections. 11 - steel columns of overall dimension with arms. 12 - reinforced-concrete columns of height to .... 13 - support of farm/trusses with belt/zones from welded T's to reinforced-concrete column. 14 - bolsters for the fin/edges of plate/slabs. 15 - anchor bolts ....

end T930104.

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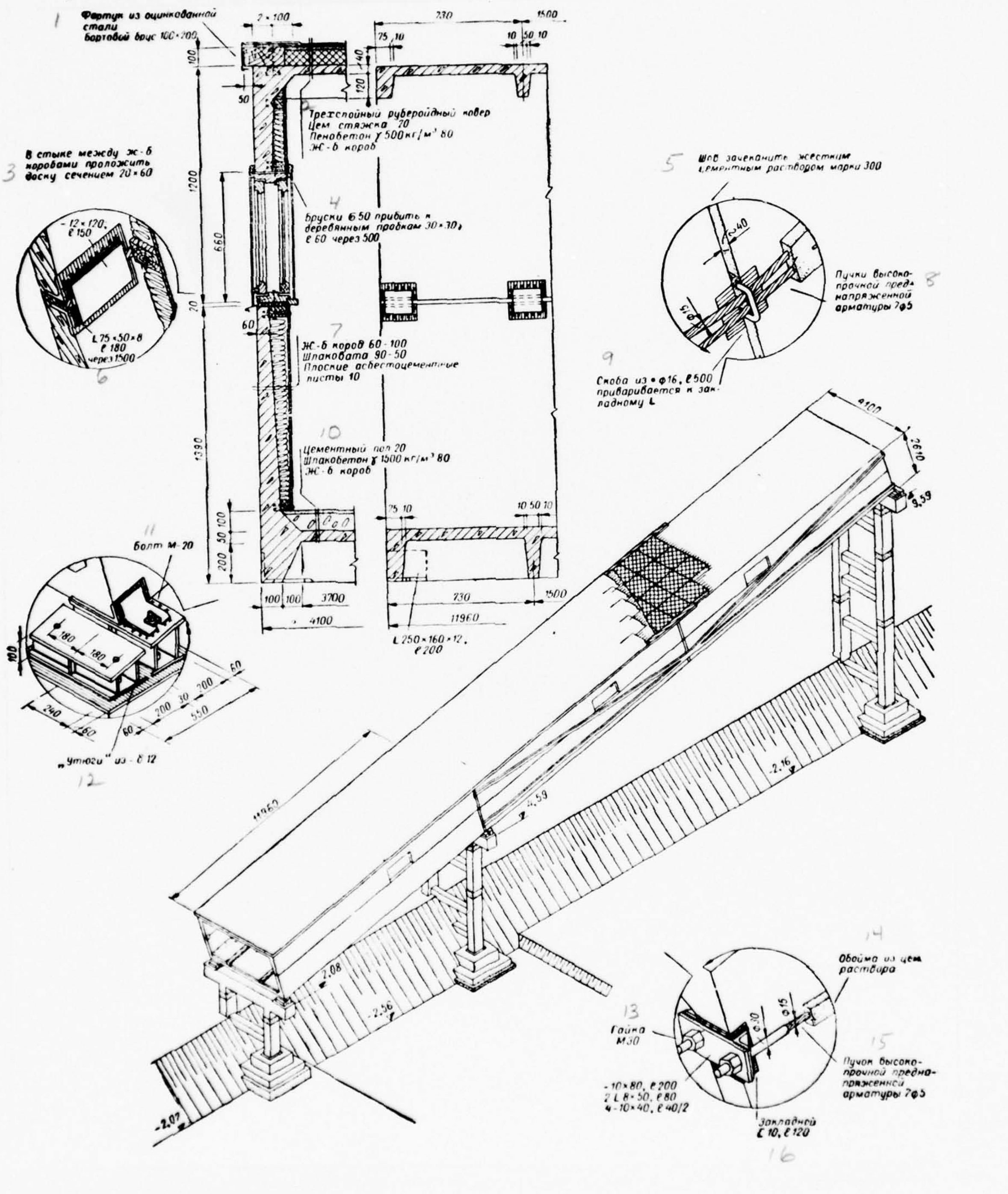
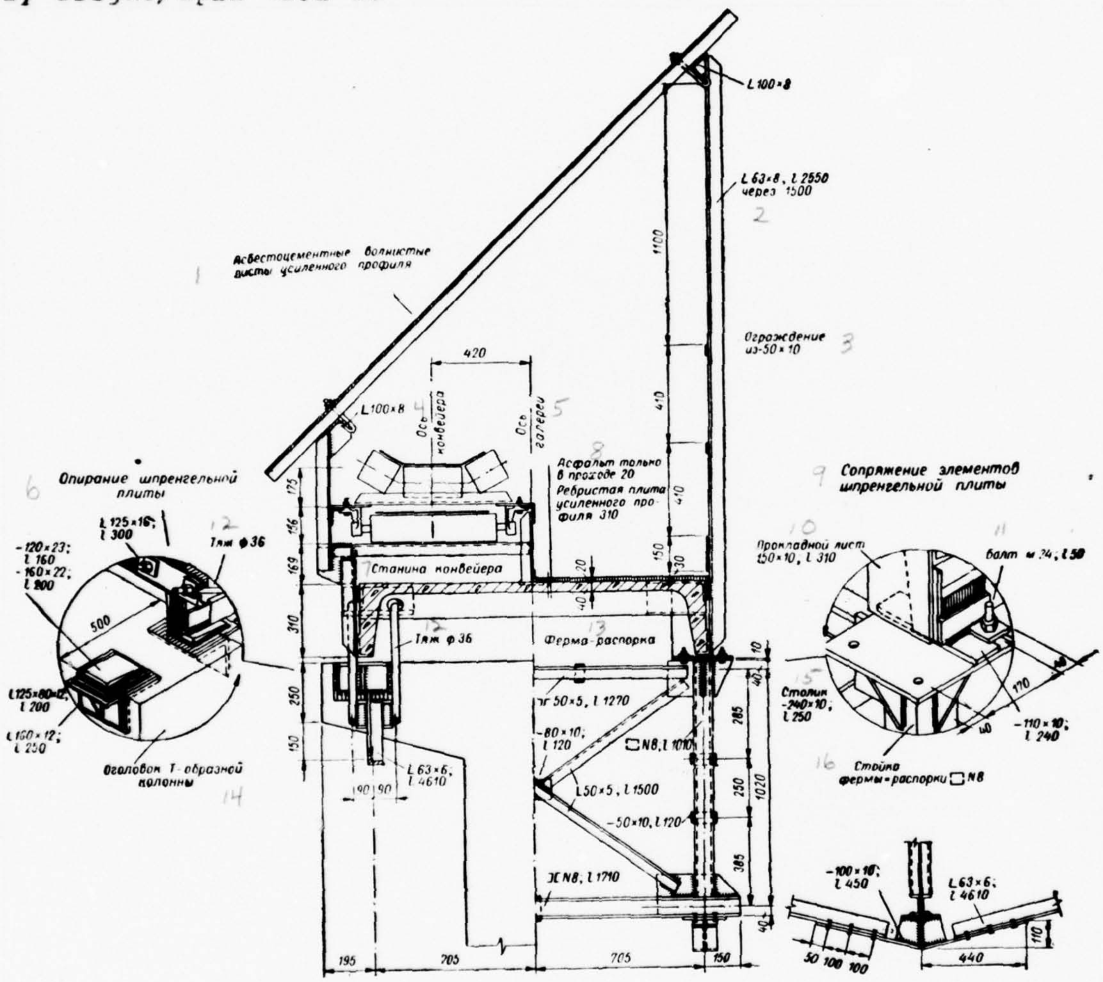
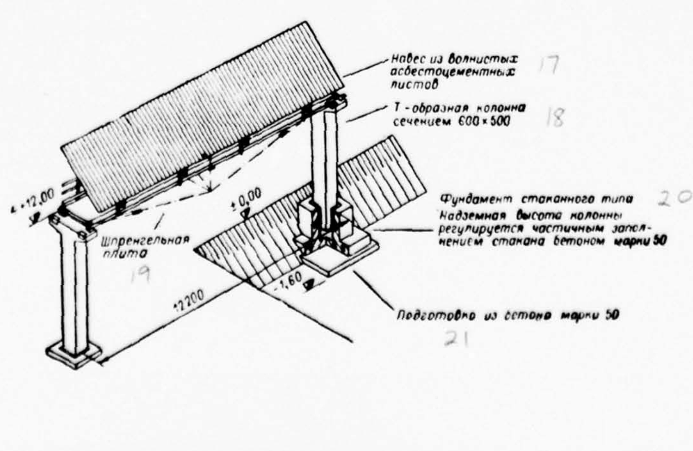
Sheet 71. Gallery of the intensified by strut frame box section from U-shaped reinforced-concrete cell/elements by flight/span to 24 m.



Key: 1 - apron made of galvanized iron on-board beam .... 2 - three-layered ruberoid carpet. Cement tie piece ... cellular concrete ... kg/m³ is reinforced-concrete duct. 3 - in the joint between it is reinforced-concrete by ducts to lay panel by section/cut ... . 4 - bars ... to nail to wooden sample/tests ... through .... 5 - weld to caulk by rigid cement mortar of mark/brand .... 6 - ... through. 7 is reinforced-concrete duct ... slag wool ... flat/plane asbestos cement sheets .... 8 - beams of the high-strength prestressed fittings .... 9 - bracket from ... it is welded to laying .... 10 - cement sex/floor ... slag concrete ... kg/m³ ... is reinforced-concrete duct. 11 - bolt .... 12 - "irons" from .... 13 - nut .... 14 - ring from cement mortar. 15 - beam of the high-strength prestressed fittings .... 16 - laying ....

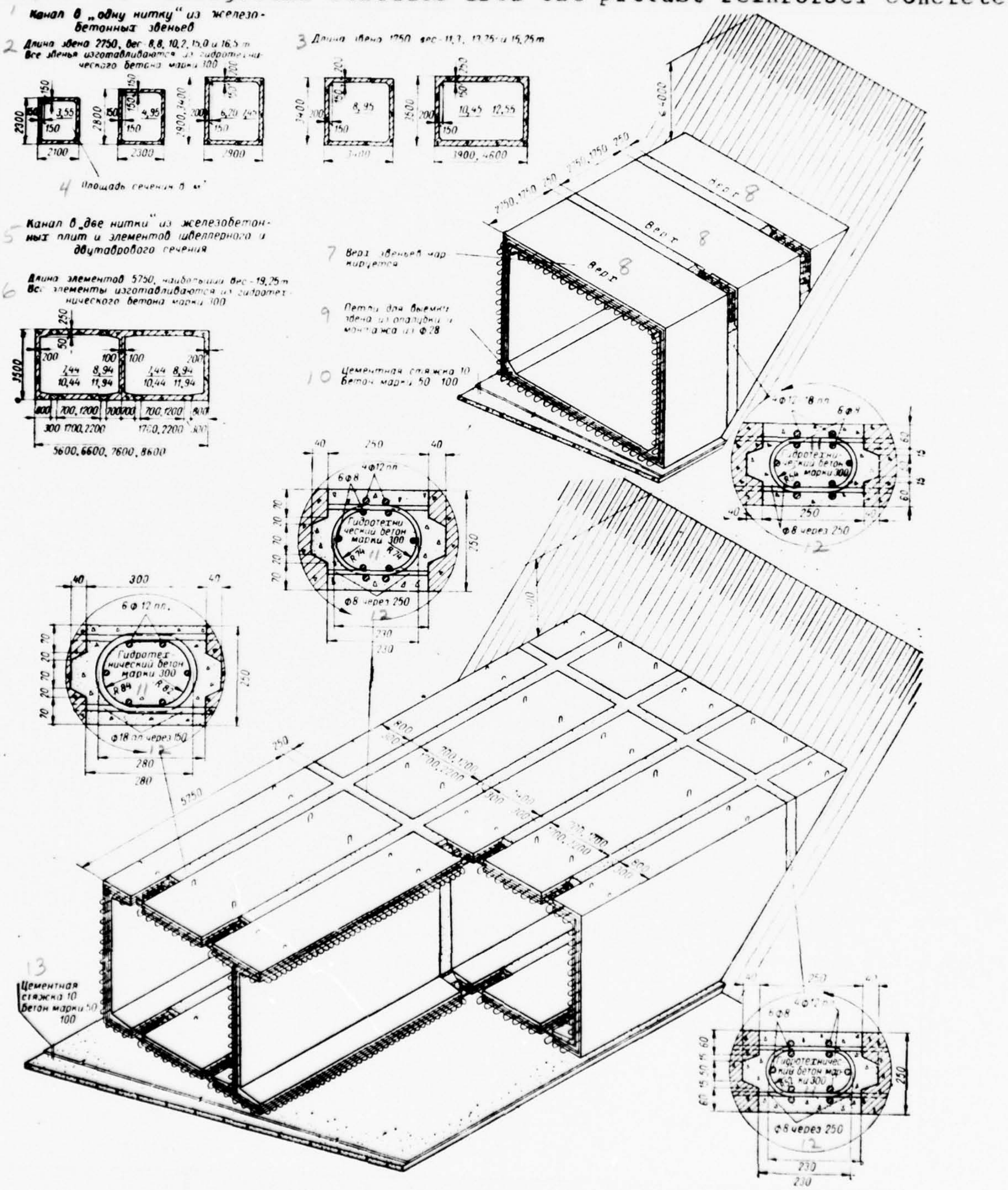
Sheet 72. Gallery on composite reinforced-concrete strut plate/slabs by flight/span 12.2 m.





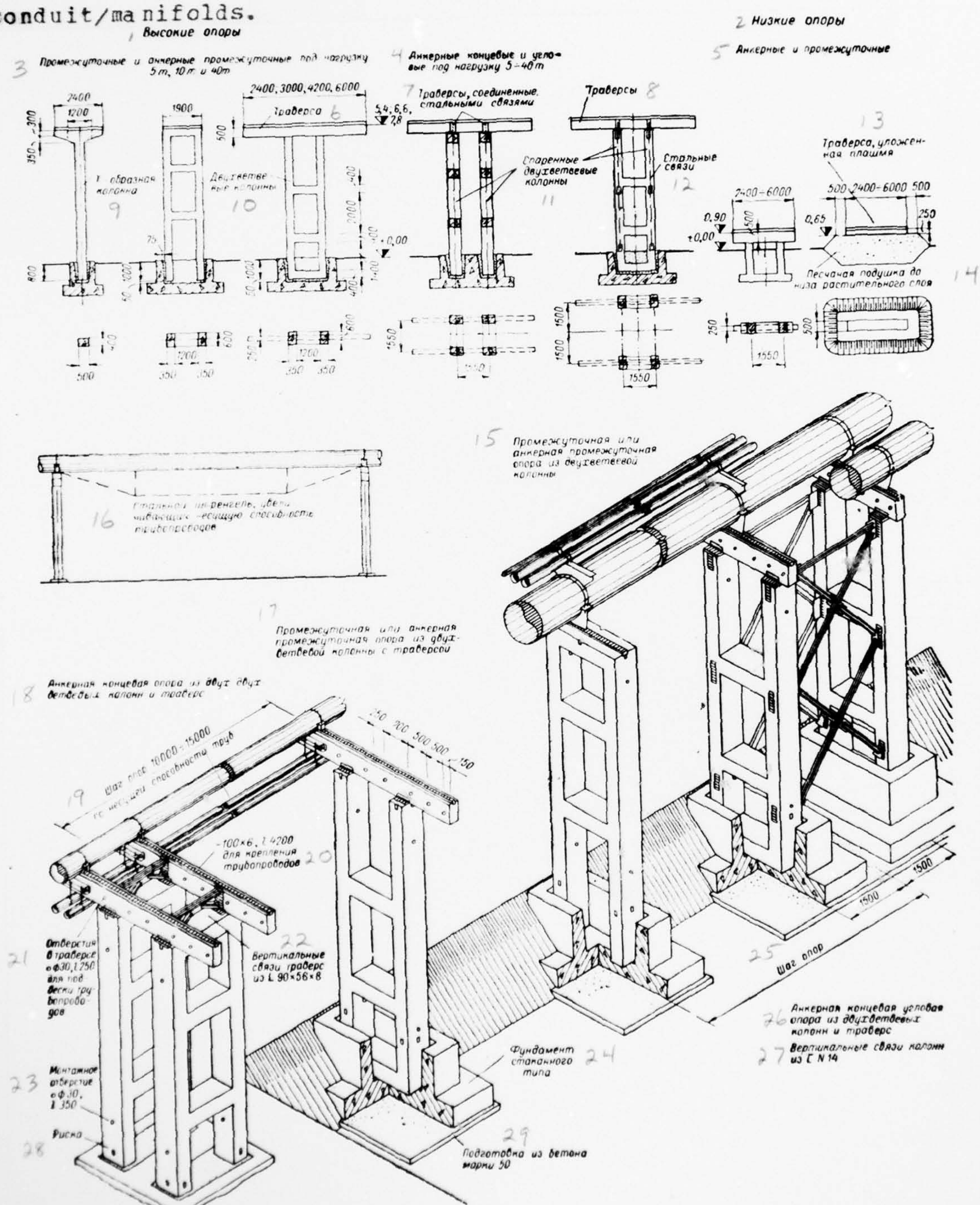
Key: 1 - asbestos cement corrugated sheets cf the intensive airfoil/profile. 2 - ... through. 3 - enclosure/protection from .... 4 - axle/axis of galleries. 6 - support of strut plate/slab. 7 - mounting of conveyor. 8 - asphalt cnly in pass ... the ribbed slab of the intensive airfoil/profile .... 9 - coupling of the cell/elements of strut plate/slab. 10 - lining sheet .... 11 - bolt m .... 12 - belt .... 13 - beam-spacer. 14 - end of t-shaped column. 15 - stand .... 16 - strut of the farm/truss = of spacer .... 17 - mounting fixture frcm corrugated asbestos cement sheets. 18 - t-shaped column by section/cut .... 19 - strut plate/slab. 20 - glass type foundation the abcve-grade height cf cclumn it is regulated by the partial filling of beaker/sleeve with concrete of mark/brand .... 21 - preparation from concrete of mark/brand ....

Sheet 73. Underground conduits from the precast reinforced concrete.



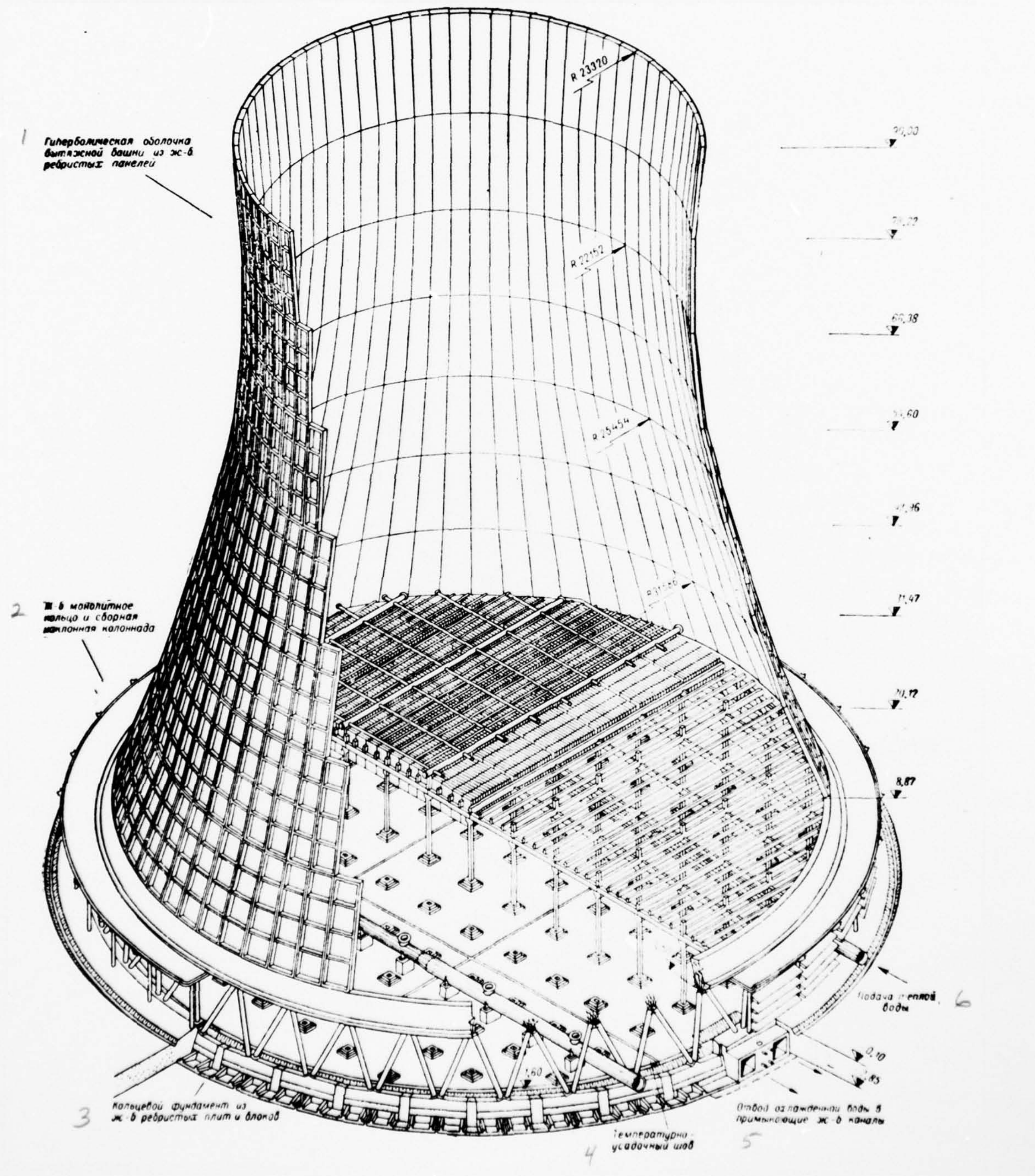
Key: 1 - channel into "one thread" of reinforced-concrete component/links. 2 - the length of component/link ... weight ... and ... t all component/links are made from hydromechanical concrete of mark/brand .... 3 - length of component/link ... weight ... and ... t. 4 - cross-sectional area in .... 5 - channel into "two threads" from reinforced-concrete plate/slabs and the cell/elements of channel and double-T section/cut. 6 - the length of cell/elements ... the greatest weight ... t weight cell/elements are made from hydraulic engineering concrete of mark/brand ..... 7 - the top of component/links it is marked. 8 - top. 9 - loops for the indentation of component/link from planking and assembly from .... 10 - cement tie piece is concrete of mark/brand ... ./11 - hydraulic engineering concrete of mark/brand .... 12 - ... through .... 13 - cement tie piece ... concrete of mark/brand ....

Sheet 74. Reinforced-concrete supports of steel above-grale conduit/manifolds.



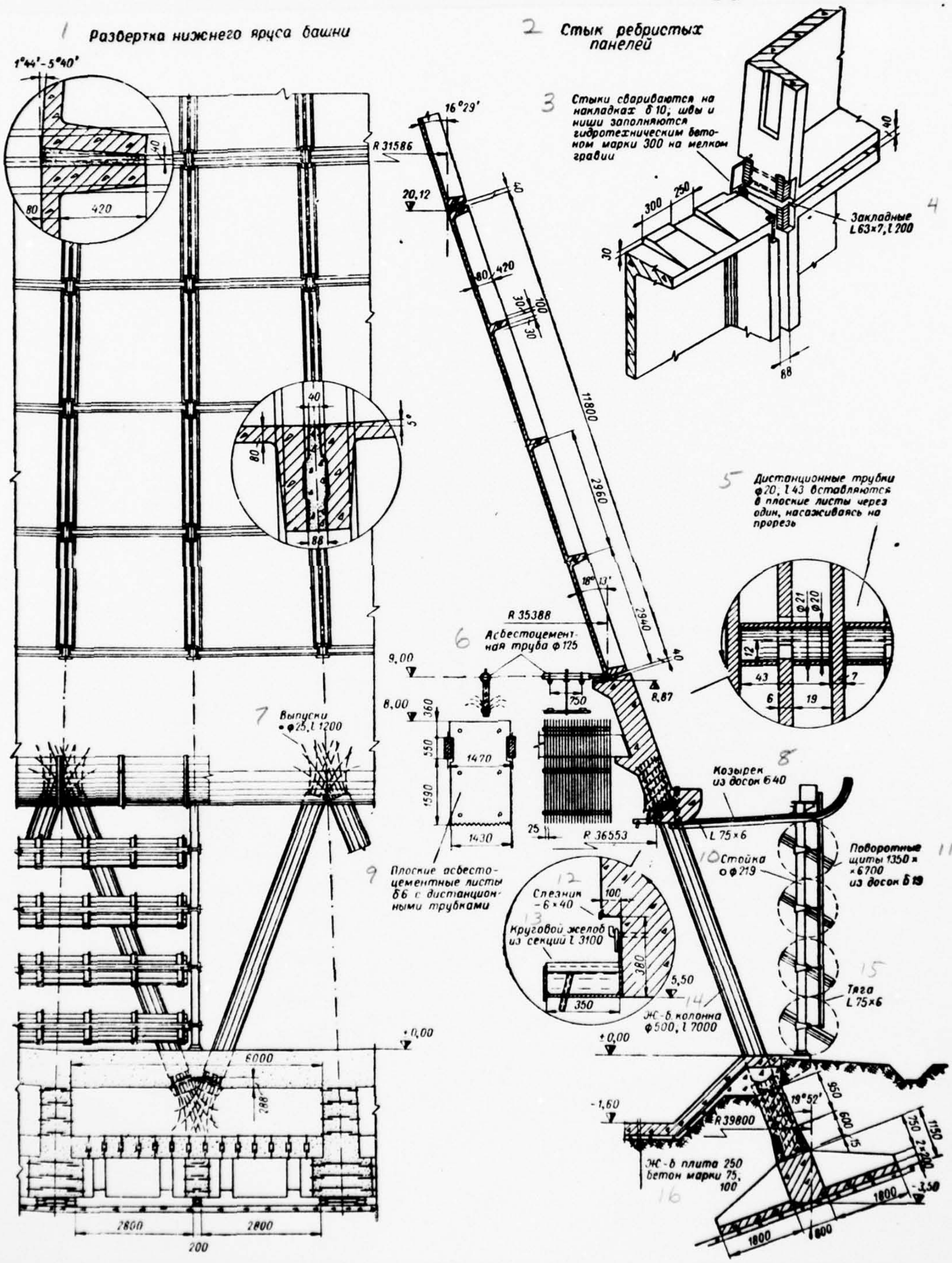
Key: 1 - high supports. 2 - low supports. 3 - intermediate and anchor intermediates under load 5 t, 10 t and 40 t. 4 - anchor end and angular under load ... t. 5 - anchor and intermediate. 6 - traverse. 7 - traverses, connected, by steel communication/connections. 8 - traverses. 9 - t-shaped column. 10 - two-branched columns. 11 - paired two-branched columns. 12 - steel communication/connections. 13 - traverse, packed prone. 14 - sand pillow to the bottom of vegetable layer. 15 - intermediate or anchor inner bearing from two-branched column. 16 - steel strut frame, which increases the bearing capacity of conduit/manifolds. 17 - intermediate or anchor inner bearing from two-branched column with crosshead. 18 - anchor end support of two two-branched columns and traverse. 19 - step/pitch of supports ... according to the bearing capacity of ducts. 20 - ... for fastening of conduit/manifolds. 21 - holes in traverse ... for the suspension of conduit/manifolds. 22 - vertical communication/connections of crossheads from .... 23 - open hole .... 24 - glass type foundation. 25 - step/pitch of supports. 26 - anchor end corner pole from communication/connections of columns from .... 28 - risk. 29 - preparation from concrete of mark/brand ....

Sheet 75. Saltpan with hyperbolic tower from the precast reinforced concrete (area of irrigation 4000 m².



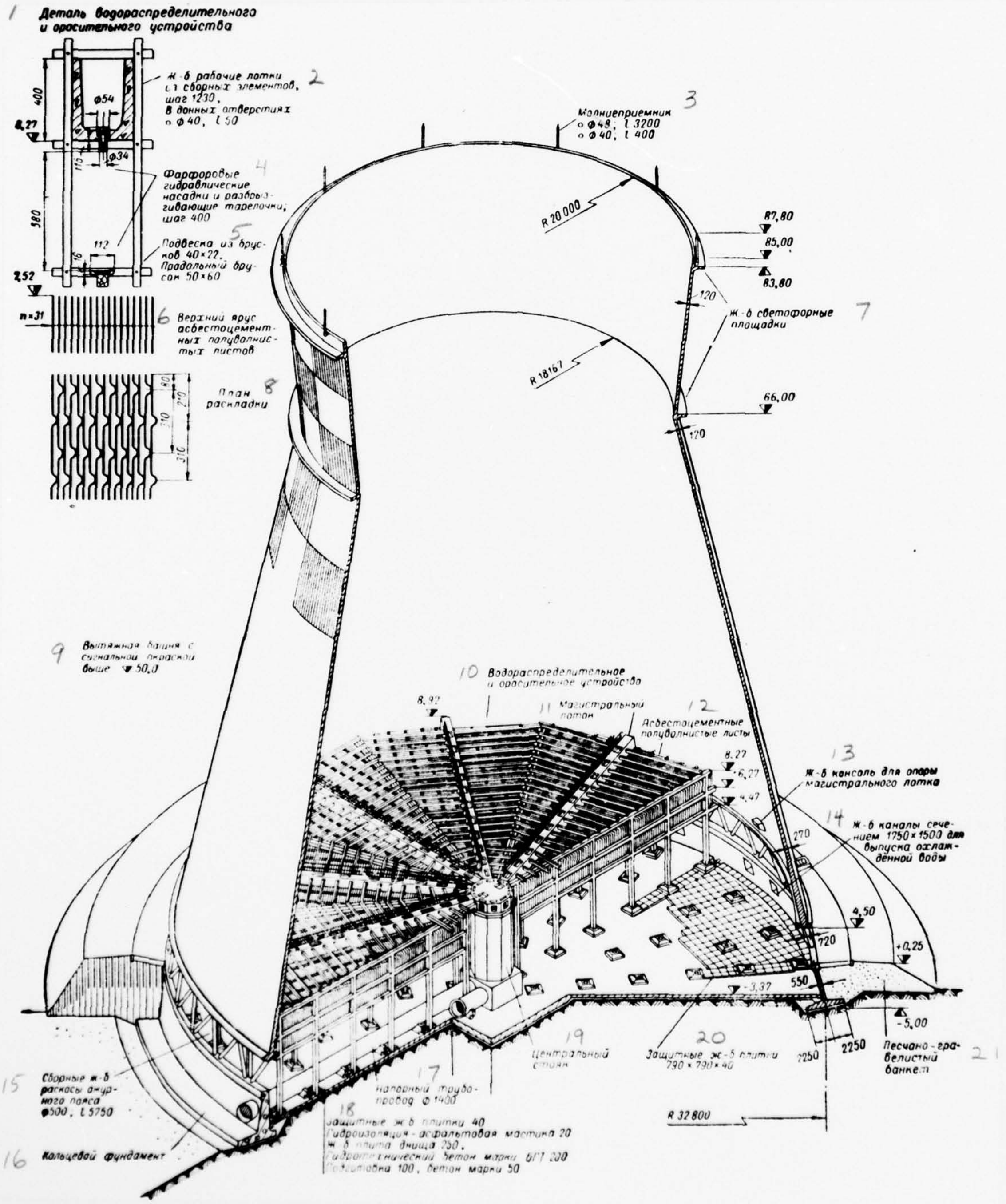
Key: 1 - hyperbolic shell of exhaust tower from is reinforced-concrete finned panels. 2 it is reinforced-concrete monolithic ring and composite inclined colonnade. 3 - circular foundation from it is reinforced-concrete ribbed slabs and blocks. 4 - temperature-shrinkage weld. 5 - diversion/tap of the cooled water into the adjacent reinforced-concrete channels. 6 - supply of warm water.

Sheet 76. Parts and the assembling units of hyperbolic tower.



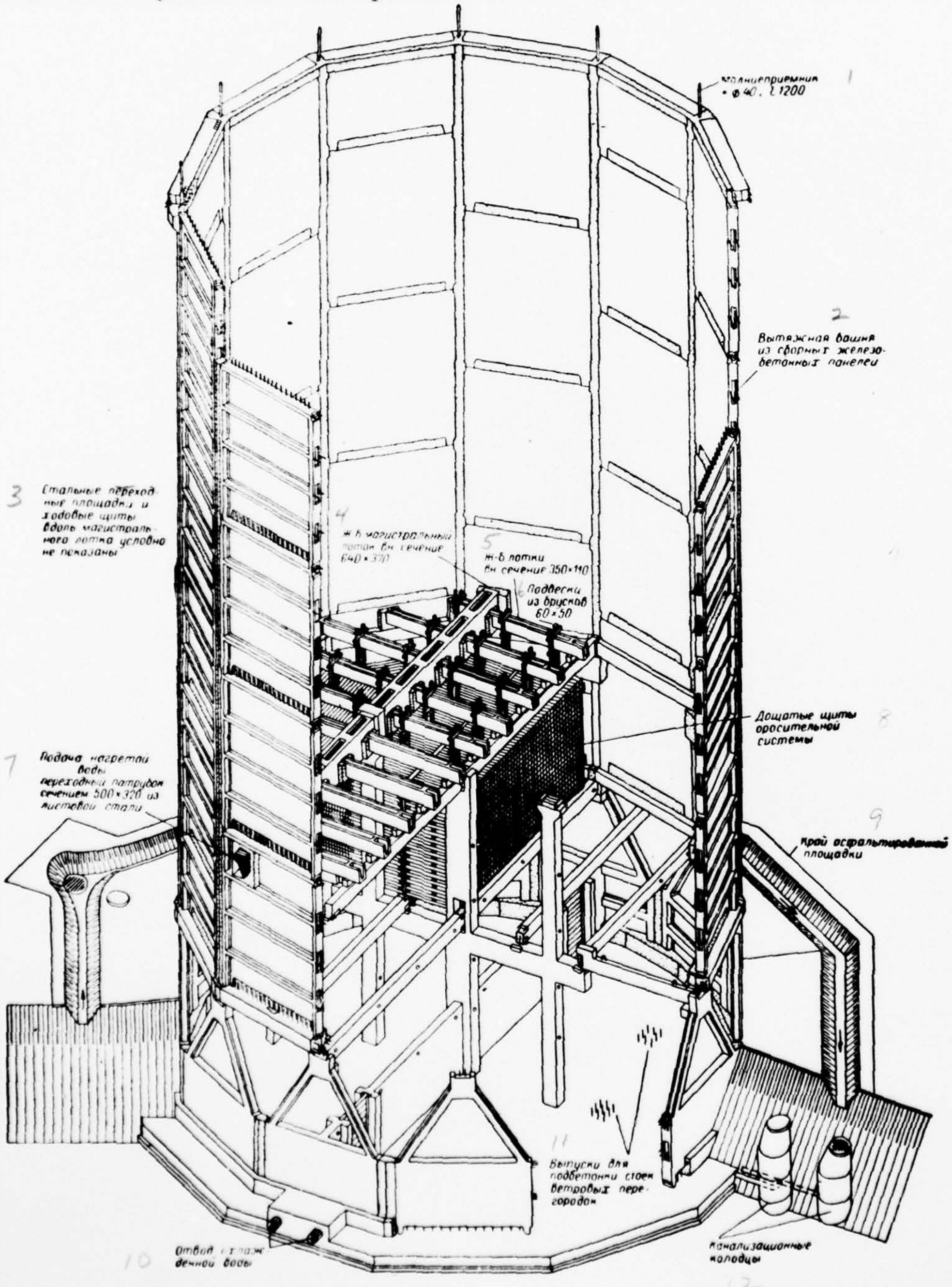
Key: 1 - scan/development of the lower tier cf tower. 2 - joint of finned panels. 3 - joints are welded on cover plates ... welds and niches they are filled with hydraulic engineering concrete of mark/brand ... on small gravel. 4 - laying .... 5 - distance tubes ... they are inserted into the flat sheets through one, being mount/fited the gash. 6 - asbestos cement duct .... 7 - issues ..... 8 - deflector from panels .... 9 - flat/plane asbestos cement sheets ... with distance tubes. 10 - strut .... 11 - rotary panels ... from panels .... 12 - drip ring .... 13 - circular groove from sections .... 14 It is reinforced-concrete column .... 15 - thrust/rod .... 16 Is reinforced-concrete plate/slab ... concrete of mark/brand ....

Sheet 77. Saltpan with monolithic reinforced-concrete biconical tower (area of irrigation 2800 m²).



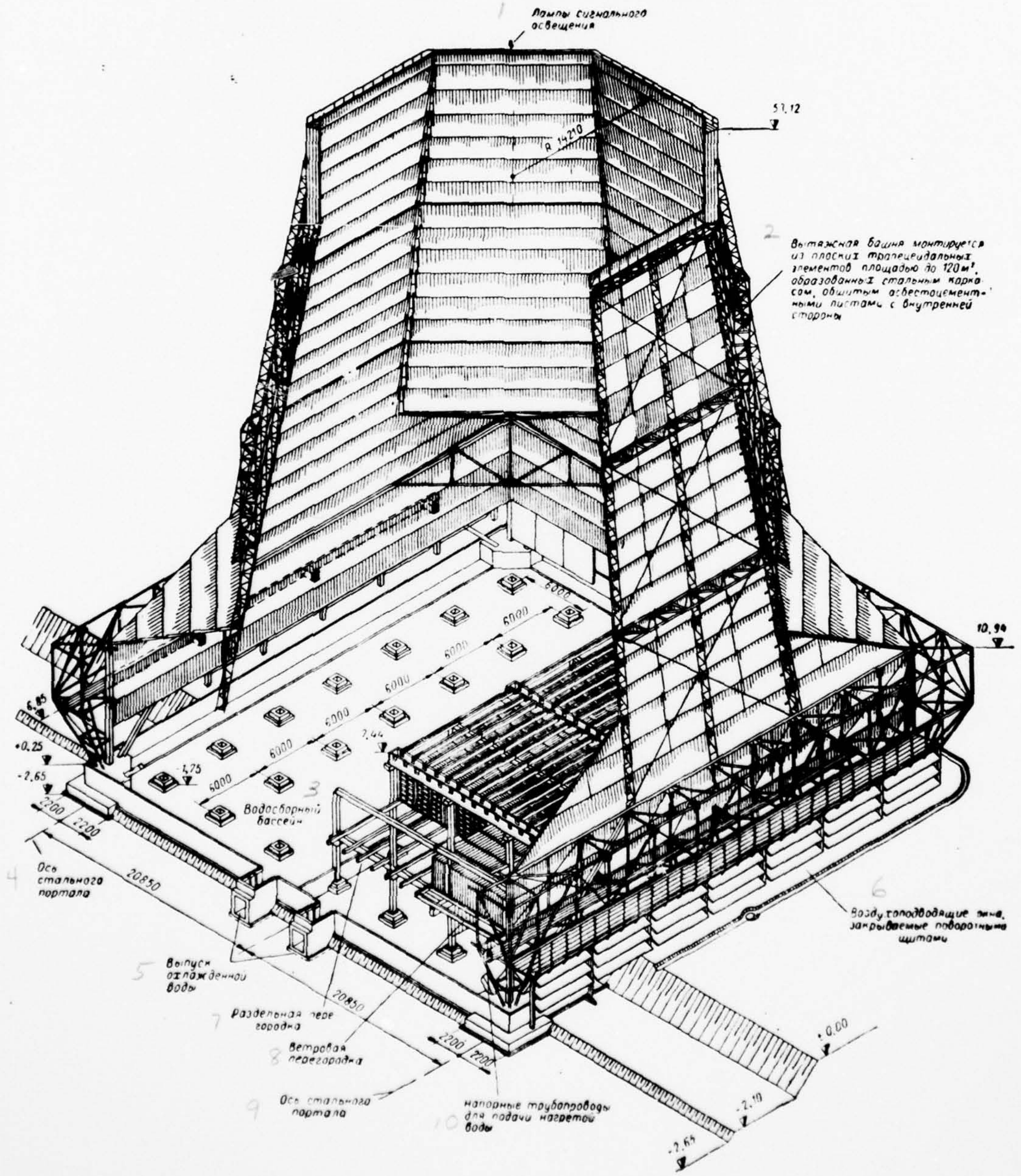
Key: 1 - part of water-distribution and irrigation device. 2 it is reinforced-concrete working tray/chutes from composite cell/elements, the step/pitch ... in bottom holes .... 3 - lightning receiver .... 4 - porcelain hydraulic cap/fillings and spattering flanges; step/pitch .... 5 - suspension from bars ... longitudinal bar .... 6 - upper tier of asbestos cement semicorrugated sheets. 7 - reinforced-concrete light signal area/sites. 8 - plan/layout of apportionment. 9 - exhaust tower with signal coloration it is above .... 10 - water-distribution and sprinkling device. 11 - main-line tray/chute. 12 - asbestos cement semicorrugated sheets. 13 It is reinforced-concrete arm for the support of main-line tray/chute. 14 - reinforced-concrete channels by section/cut ... for the issue of the cooled water. 15 - composite reinforced-concrete struts of open belt/zone .... 16 - circular foundation. 17 - delivery conduit .... 18 - shielding reinforced-concrete slabs ... a waterproofing-asphalt mastic ... the reinforced-concrete plate/slab of bottom ... hydraulic engineering concrete of mark/brand ... preparation ... concrete of mark/brand .... 19 - central standpipe. 20 - shielding reinforced-concrete slabs .... 21 - sand-and-gravelly banquet/embankment.

Sheet 78. Saltpan with cylindrical tower from the precast reinforced concrete (area of irrigation 115 m².



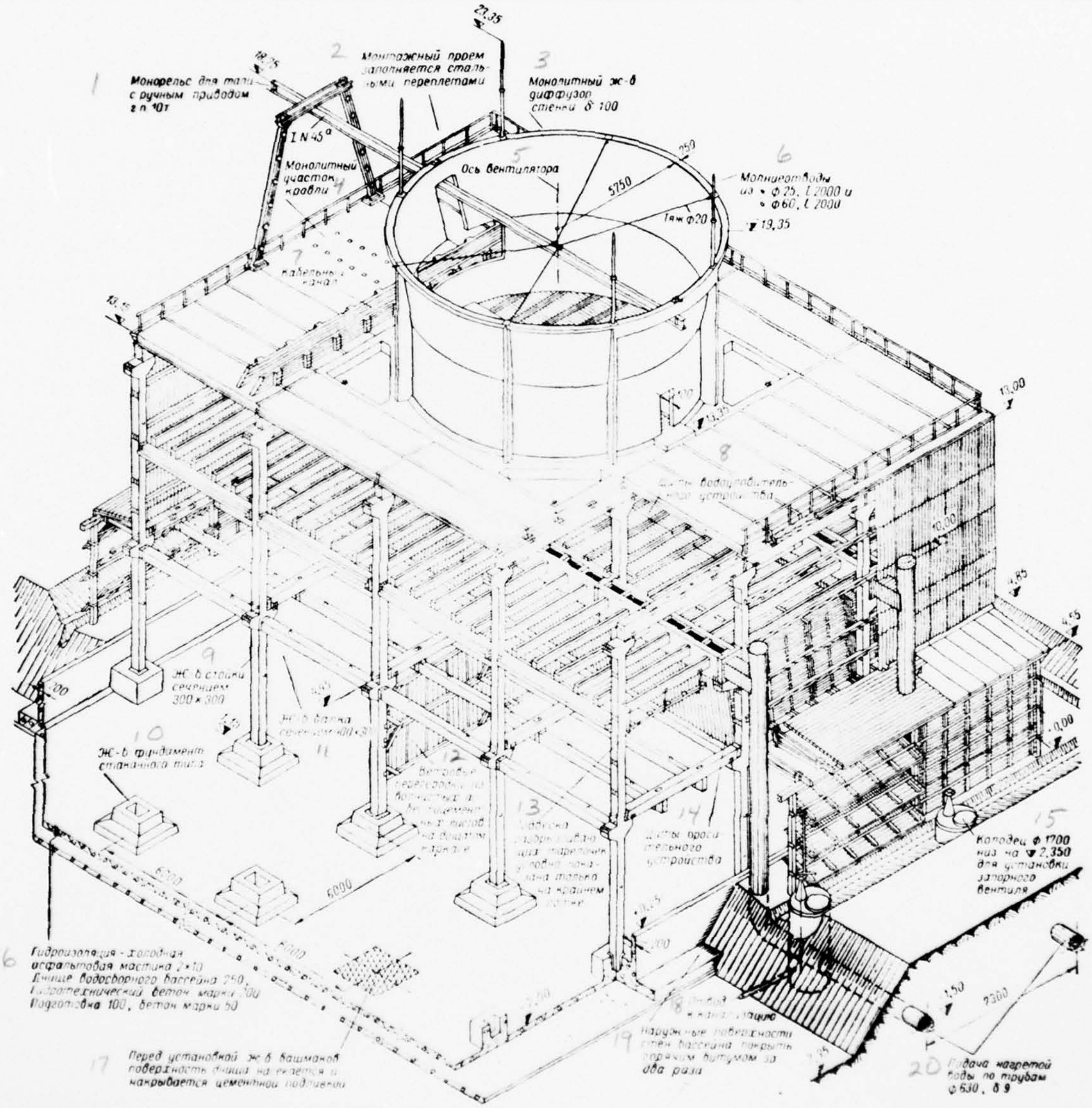
Key: 1 - lightning receiver .... 2 - exhaust tower from composite reinforced-concrete panels. 3 - steel gangways and running panels along main-line tray/chute are not conditionally shown. 4 - reinforced-concrete main-line tray/chute is external section/cut..... 5 - reinforced-concrete tray/chutes external section/cut .... 6 - suspensions from bars .... 7 - supply of the heated water reducer by section/cut ... made of sheet steel. 8 - plank shields of sprinkling system. 9 - edge of the asphalted area/site. 10 - diversion/tap of the cooled water. 11 - issues for footers of the struts of wind partitions. 12 - sewerage wells.

Sheet 79. Saltpan with pyramidal tower from steel framework/body, with enclosure/protection from corrugated asbestos cement sheets (area of irrigation 1600 m²).



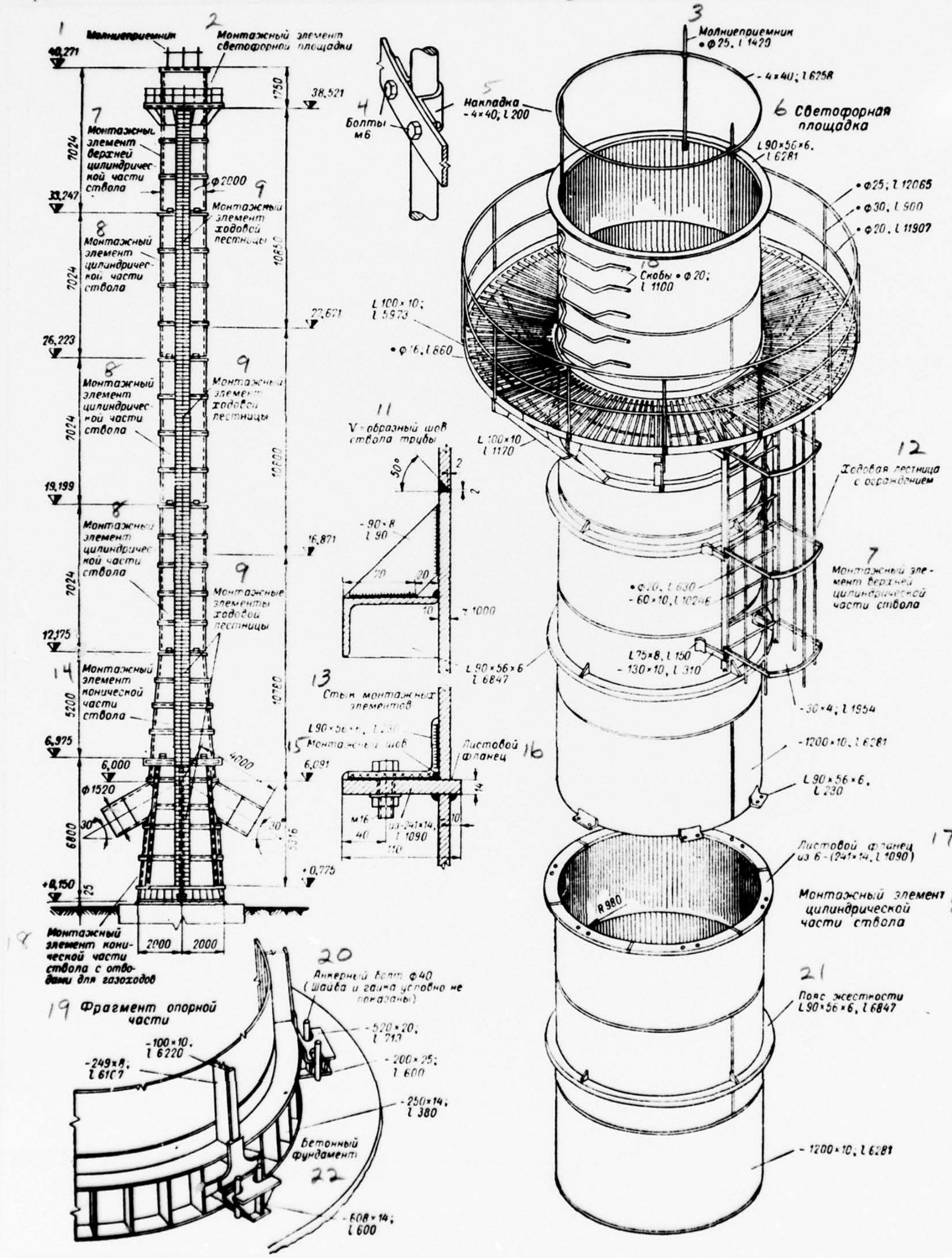
Key: 1 - lamps of signal illumination. 2 - exhaust tower it is installed from flat/plane trapezoidal elements of area to 120 m^2, formed by the steel framework/body, sheathed by asbestos cement sheets from inside. 3 - water-collecting basin. 4 - axle/axis of steel portal. 5 - issue of the cooled water. 6 - air-supply windows, closed with rotary panels. 7 - separate partition. 8 - wind partition. 9 - axle/axis of steel portal. 10 - delivery conduits for the supply of the heated water.

Sheet 80. Section of ventilator saltpan (area of irrigation 400 m^2.



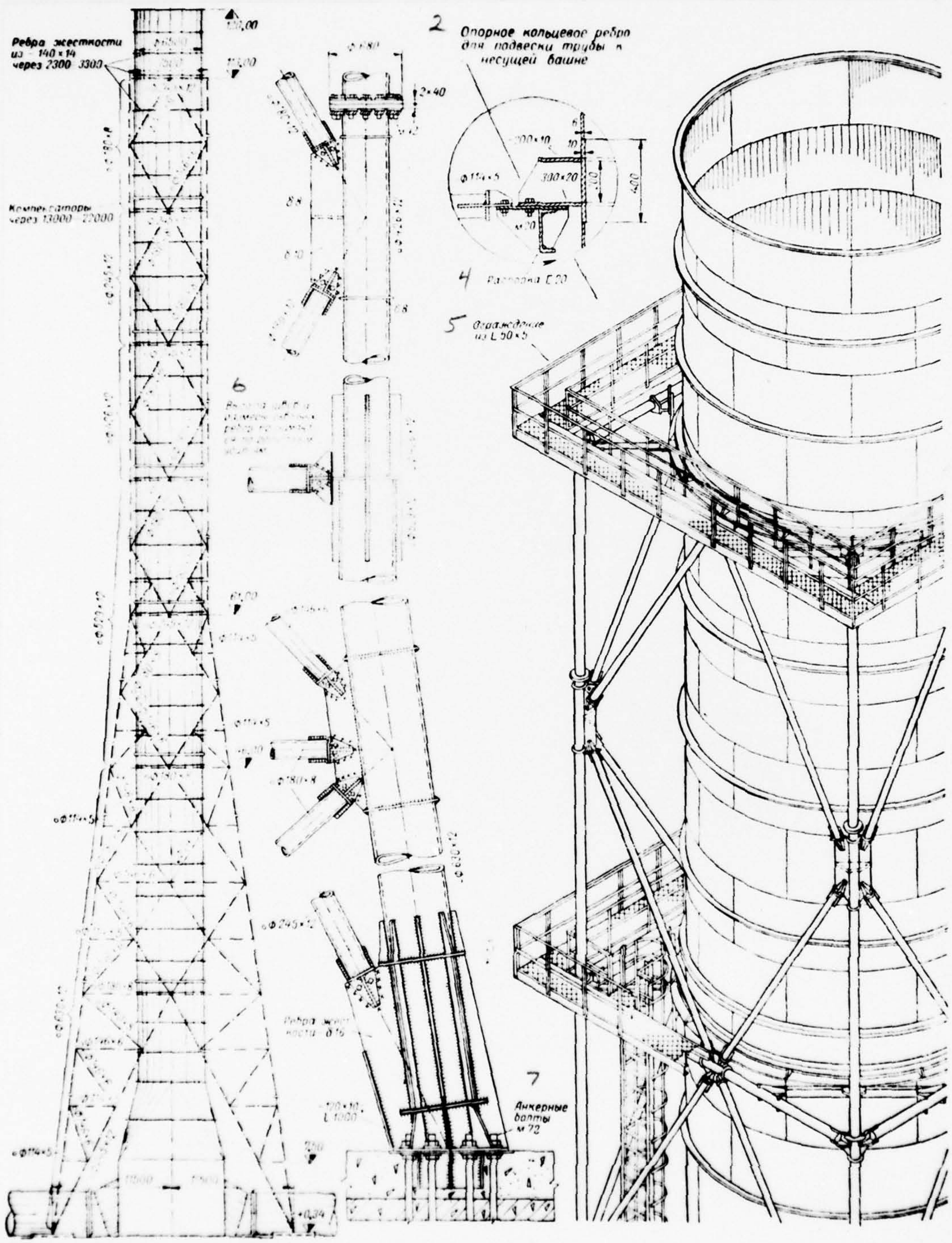
Key: 1 - monorail for a pulley block with hand drive g.p. .... 2 - assembling aperture it is filled with steel interlacings. 3 - monolithic reinforced-concrete diffuser of wall ..... 4 - monolithic section of roofing. 5 - axle/axis of fan. 6 - lightning controls from ... and .... 7 - cable duct. 8 - panels of water-trap device. 9 - reinforced-concrete struts by section/cut ..... 10 - glass type reinforced-concrete foundation. 11 - reinforced-concrete beam by section/cut .... 12 - wind partitions from corrugated asbestos cement sheets on made of planks framework/body. 13 - the suspension of the spattering flanges is conditionally shown only on extreme tray/chute. 14 - panels of sprinkling device. 15 - well ... bottom on ... for the setting up of shutoff valve. 16 - waterproofing-cold mastic asphalt ... the bottom of water-collecting basin ... hydraulic engineering concrete of mark/brand ... preparation ... concrete of mark/brand .... 17 - before the setting up of reinforced-concrete shoes the surface of bottom is cut and is covered with cement dressing. 18 - diversion/tap into canalization/sewerage. 19 - external surfaces of the walls of basin to cover with hot bitumen two times. 20 - supply of the heated water along ducts ....

Sheet 81. Steel air flue 40 m in high.



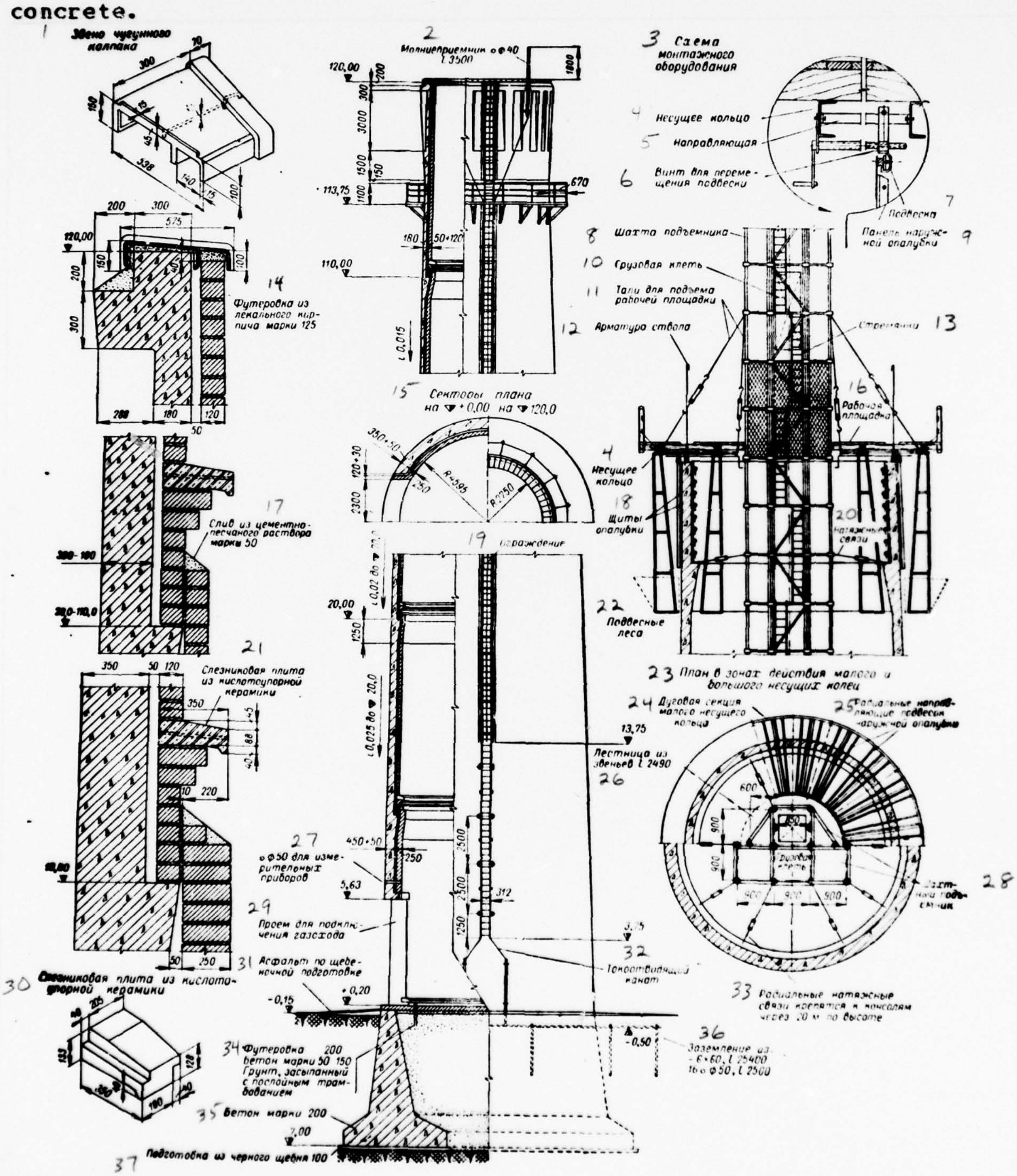
Key: 1 - lightning receiver. 2 - the assembling cell/element of light signal area/site 3 - lightning receiver .... 4 - bolts .... 5 - cover plate .... 6 - light signal area/site. 7 - assembling cell/element of the upper cylindrical part of the shank. 8 - assembling cell/element of the cylindrical part of the shank. 9 - assembling cell/element of running staircase. 10 - brackets .... 11 - ... the figurative weld of the shank of duct. 12 - running staircase with enclosure/protection. 13 - joint of assembling cell/elements. 14 - assembling cell/element of the conical part of the shank. 15 - assembling weld. 16 - laminated flange. 17 - laminated flange from .... 18 - assembling cell/element of the conical part of the shank with diversion/taps for flues. 19 - fragment of supporting/reference part. 20 - anchor bolt ... (washer and nut are not conditionally shown). 21 - belt/zone of rigidity .... 22 - concrete foundation.

Sheet 82. Steel air flue 120 m in high in carrying tower.



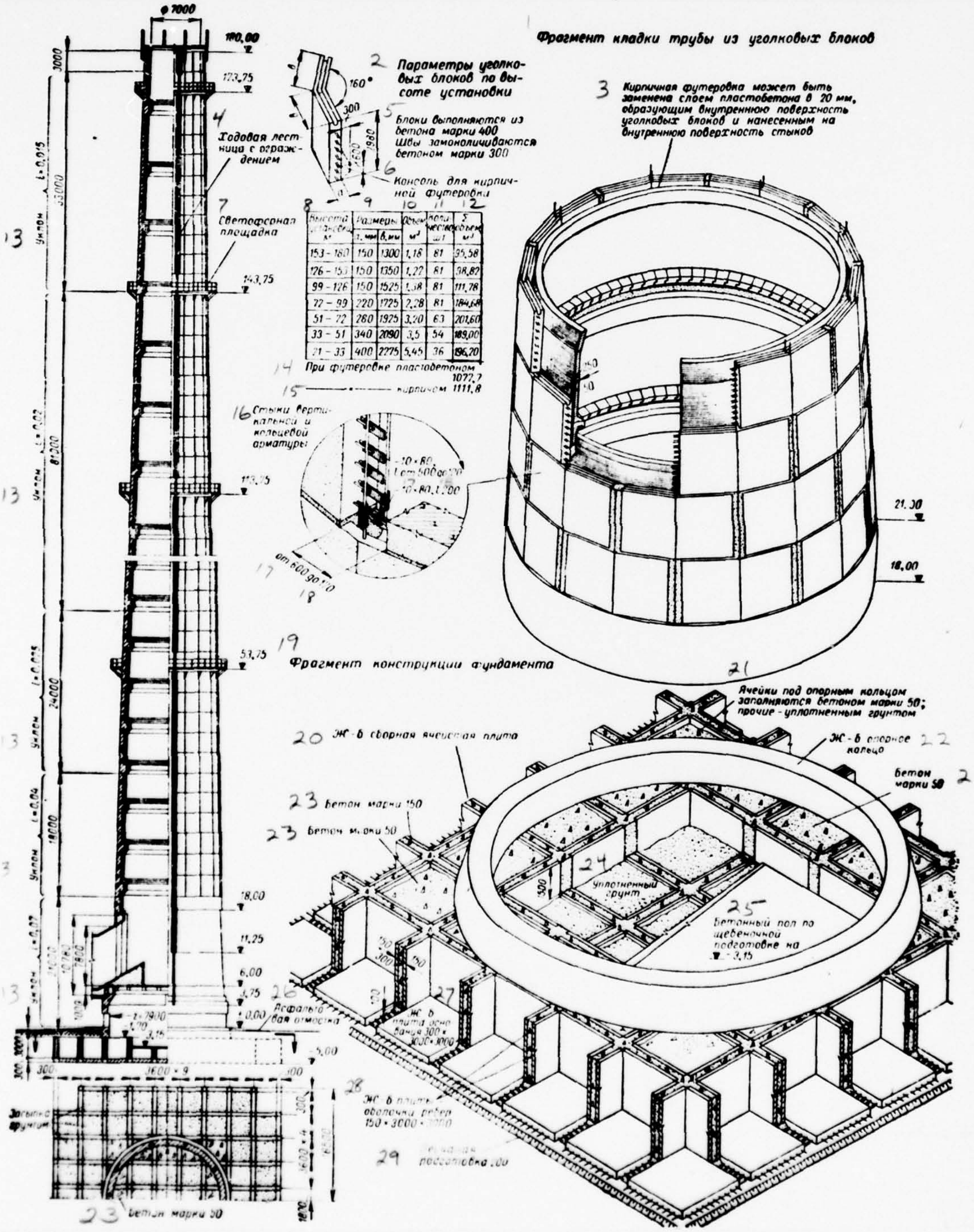
Key: stiffening ribs frcm ... through .... 2 - supporting/reference circular fin/edge for the suspension of duct tc carrying tower. 3 - compensators through .... 4 - spacer .... 5 - enclosure/protection frcm .... 6 - throat and the size/dimensions of through fin/edges they are accepted on calculated effort/forces. 7 - anchor bolts ....

Sheet 83. Chimney stack 120 m in high made cf monolithic reinforced concrete.



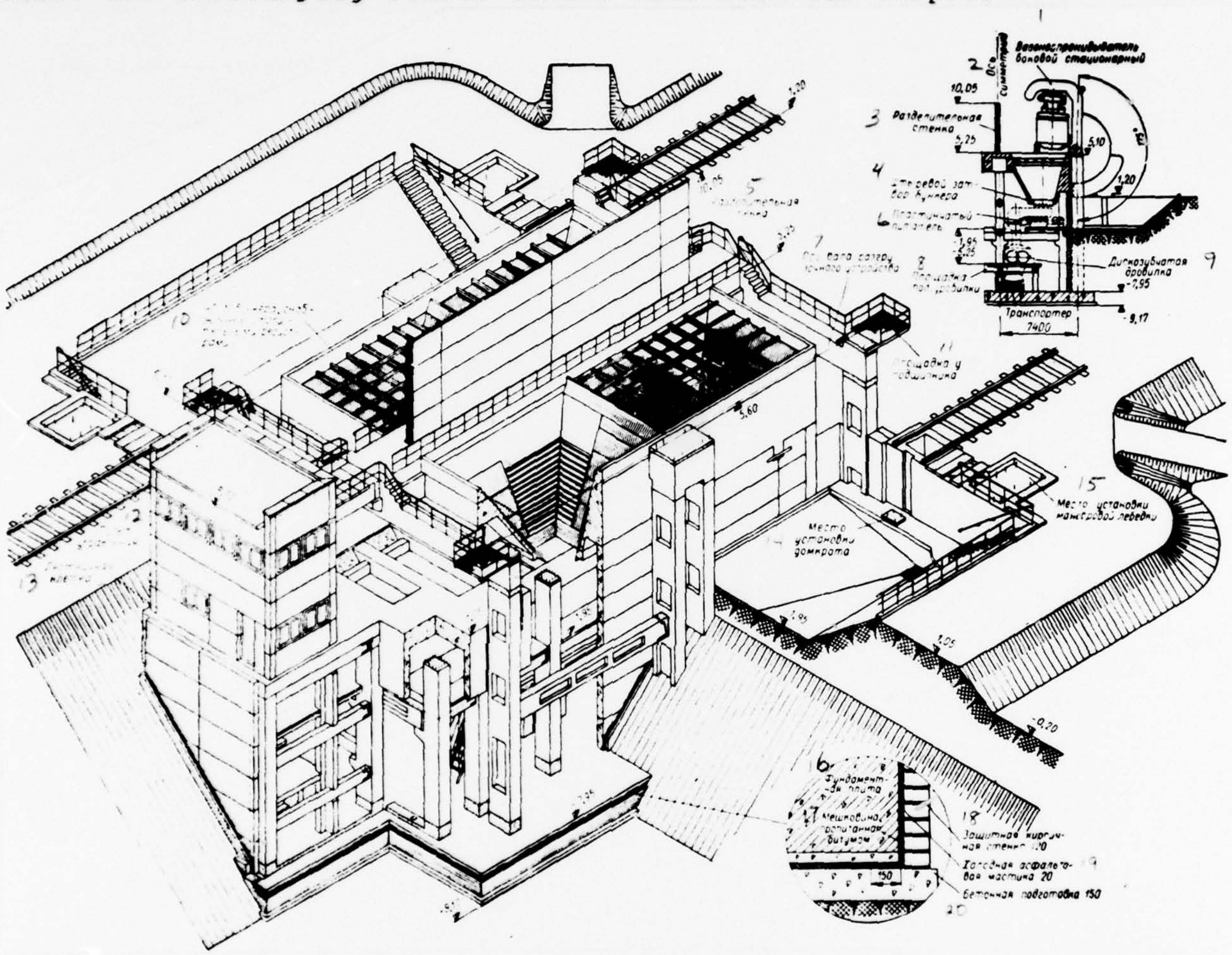
Key: 1 - component/link of cast iron cap/hood. 2 - lightning receiver .... 3 - diagram of the erection equipment. 4 - carrying ring. 55 - it is directing. 6 - screw/propeller for displacing the suspension. 7 - suspension. 8 - shaft/mine of hoist. 9 - panel of external planking. 10 - cargo stand. 11 - pulley blocks for lifting service platform. 12 - fittings of shank. 13 - u-bolts. 14 - refractory lining from radial brick of mark/brand .... 15 - sectors of plan/layout on ... on .... 16 - service platform. 17 - drain from the cement-sand solution/opening of mark/brand .... 18 - panels of planking. 19 - enclosure/protection. 20 - straining ties. 21 - drip-ring plate/slab from acid-resistant ceramics. 22 - suspension of forest. 23 - plan/layout in the zones of action of small and large carrying rings. 24 - arc section of a small carrying ring. 25 - radial guides of the suspensions of external planking. 26 - staircase from component/links .... 27 - ... for measuring meters. 28 - mine hoist. 29 - aperture for the connection of flue. 30 - drip-ring plate/slab from the acid-resistant ceramics. 31 - asphalt on crushed stone preparation. 32 - current-deflecting cord. 33 - radial straining ties they are fastened to the arms through 20 m on height. 34 - refractory lining ... concrete of mark/brand ... the soil, charged with laminar tamping. 35 - concrete of mark/brand .... 36 - grounding from .... 37 - preparation from oiled crushed rock ....

Sheet 84. Chimney stack 180 m in high made cf reinforced-concrete ccrner blocks.



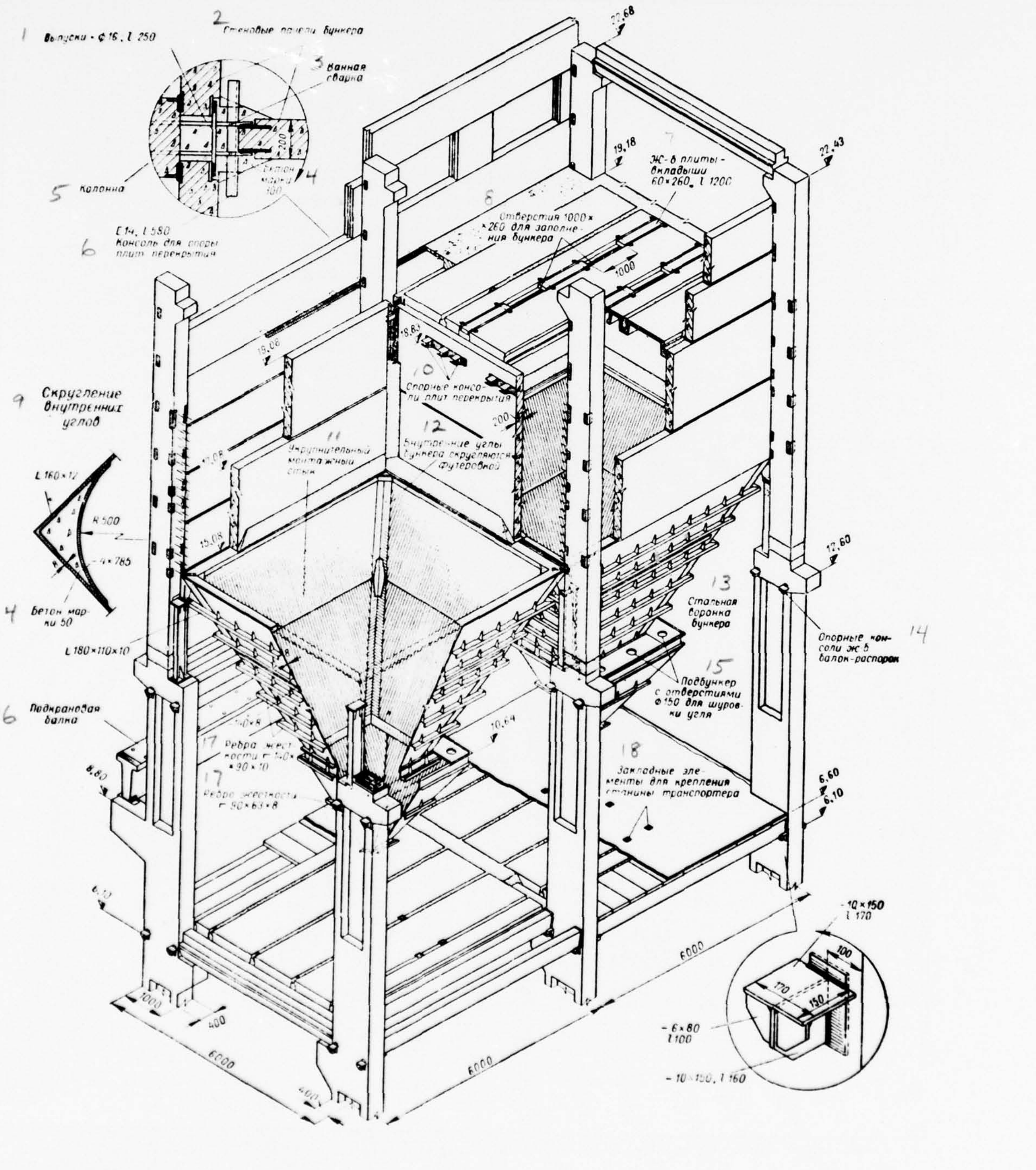
Key: 1 - fragment of the laying of duct from corner blocks. 2 - parameters of corner blocks on the height of setting up. 3 - brick refractory lining it can be replaced by the layer of plastic concrete in 20 mm, which form the internal surface of corner blocks and plotted/applied to internal surface it is butting. 4 - running staircase with enclosure/protection. 5 - blocks are fulfilled from concrete of mark/brand ... welds they are assembled in one piece by concrete of mark/brand .... 6 - arm for a brick refractory lining. 7 - light signal area/site. 8 - height of setting up m. 9 - size/dimensions. 10 - volume. 11 - quantity items. 12 - volume. 13 - gradient/draft ..... 14 - with refractory lining of plastic cement. 15 - by brick .... 16 - joints of vertical and circular fittings. 17 - from. 18 - to. 19 - fragment of the construction of foundation. 20 It is reinforced-concrete composite cellular/honeycomb plate/slab. 21 - cells under carrier ring are filled with concrete of mark/brand ... other - by the condensed soil. 22 It is reinforced-concrete carrier ring. 23 - concrete of mark/brand .... 24 - condensed soil. 25 - concrete sex/floor on crushed stone preparation on .... 26 - asphalt blind area. 27 It is reinforced-concrete the plate/slab of basis/base .... 28 It is reinforced-concrete the plate/slab of the shell of fin/edges .... 29 - sand preparation .... 30 - filling by soil.

Sheet 85. Discharging bunker device with side car dumper.



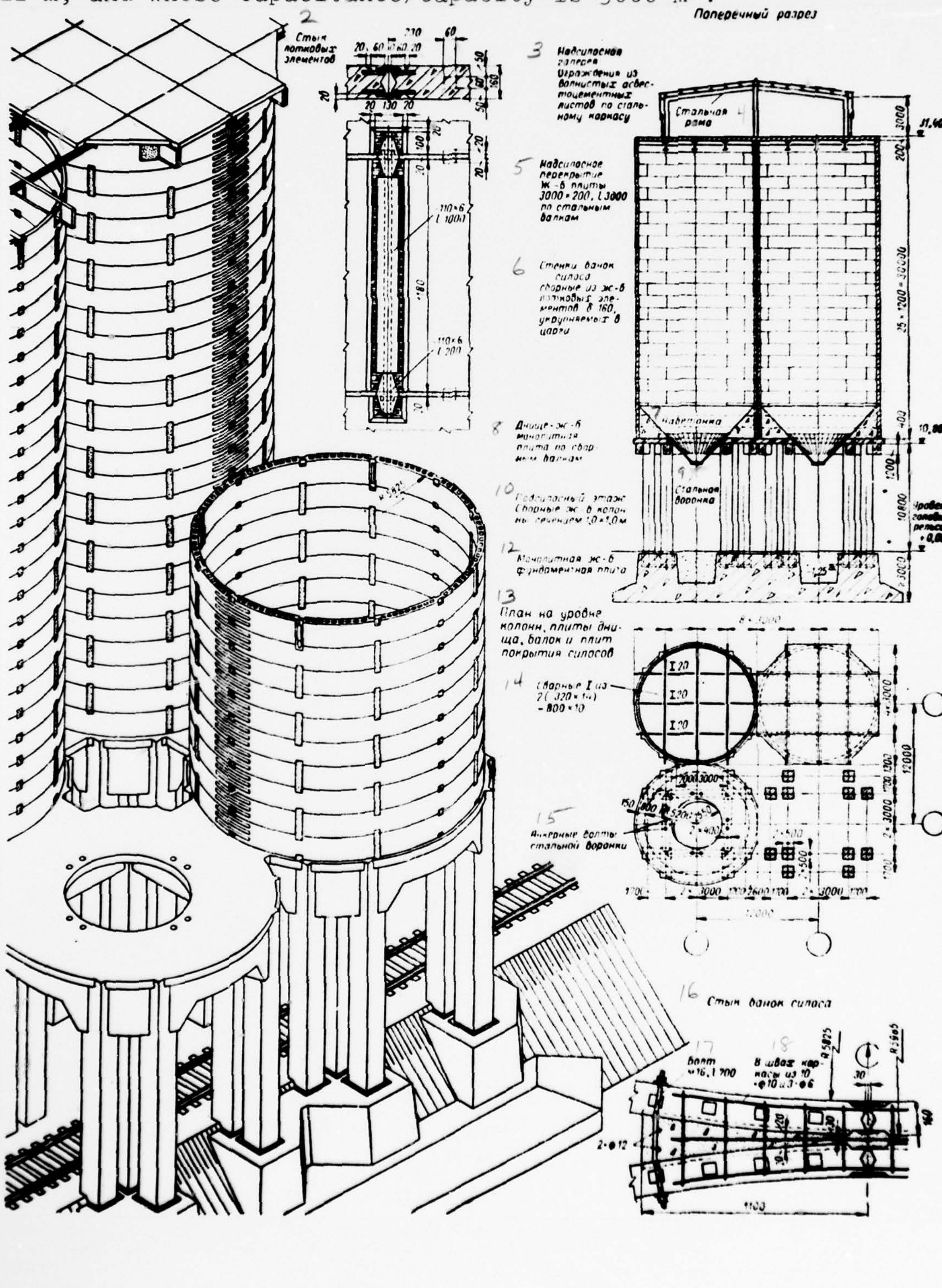
Key: 1 - dump car side stationary. 2 - axis of symmetries. 3 - dividing wall. 4 - bolt gate of hopper. 5 - dividing wall. 6 - plate feeder. 7 - axle/axis of the shaft of relief mechanism. 8 - area/site for crushers. 9 - tooth-disk crusher. 10 - reinforced-concrete hoppers, equipped with heating registers. 11 - area/site of bearing. 12 - control panel. 13 - staircase. 14 - site of installation of jack. 15 - site of installation of the shunting winch. 16 - base plate. 17 - sacking, impregnated with bitumen. 18 - shielding brick wall .... 19 - cold mastic asphalt .... 20 - concrete preparation ....

Sheet 86. Hopper for coal with panel reinforced-concrete walls and by steel funnel.



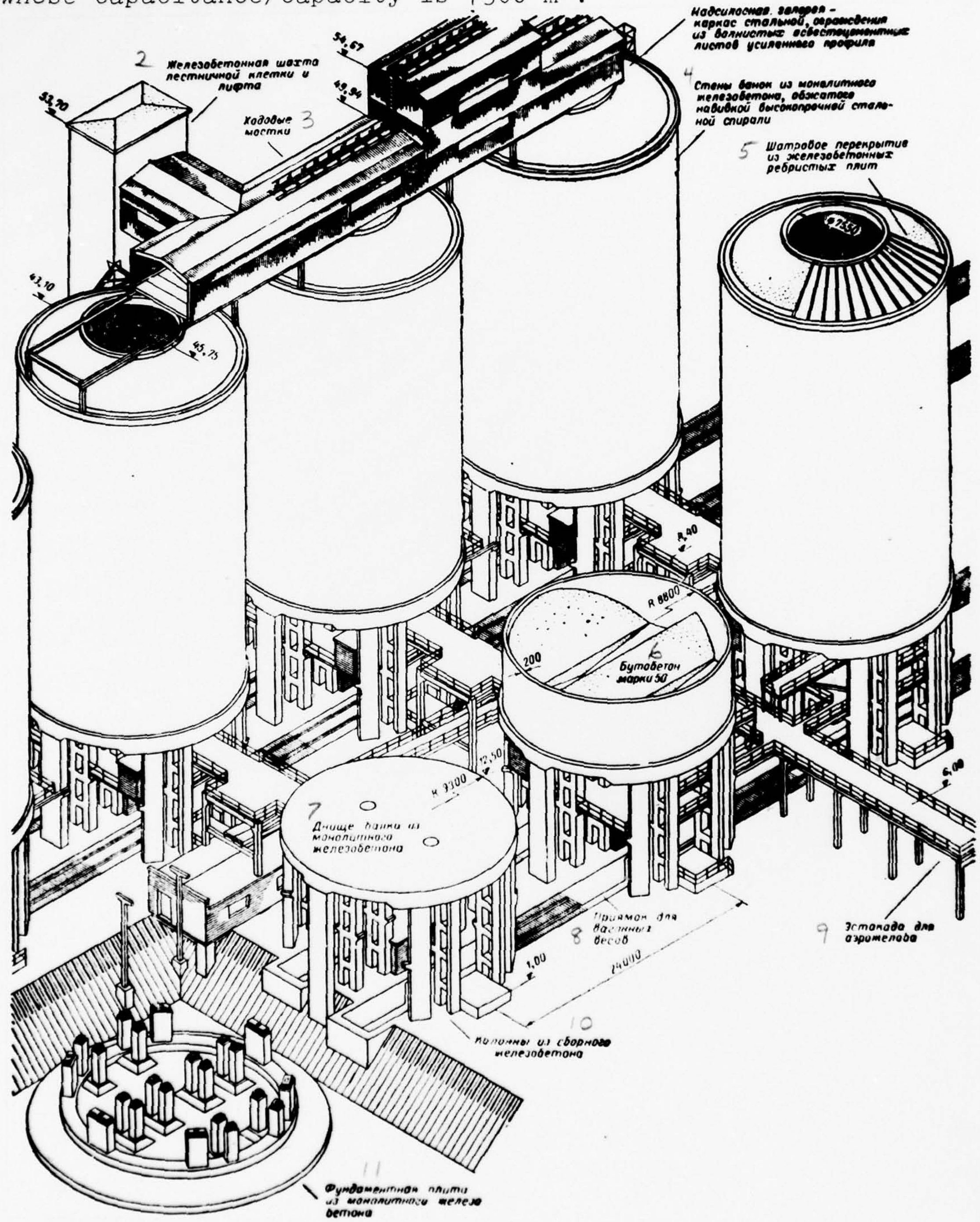
Key: 1 - issues .... 2 - wall panels of hopper. 3 - tank welding. 4 - concrete of mark/brand .... 5 - column. 6 - arm for the support of the plate/slabs of overlap. 7 - reinforced-concrete plate/slab-insert/bushings .... 8 - holes ... for filling of hopper. 9 - rounding of internal angles. 10 - bearing brackets of the plate/slabs of overlap. 11 - consolidation field joint. 12 - internal angles of hopper they are rounded off by refractory lining. 13 - steel funnel of hopper. 14 - bearing brackets of reinforced-concrete beams-spacers. 15 - sub-bunker with holes ... for the stirring of carbon. 16 - crane beam. 17 - stiffening rib .... 18 - laying cell/elements for fastening of the mounting of conveyer.

Sheet 87. Standardized section of silo housing for different materials with composite reinforced-concrete banks whose diameter is 12 m, and whose capacitance/capacity is 3000 m^3.



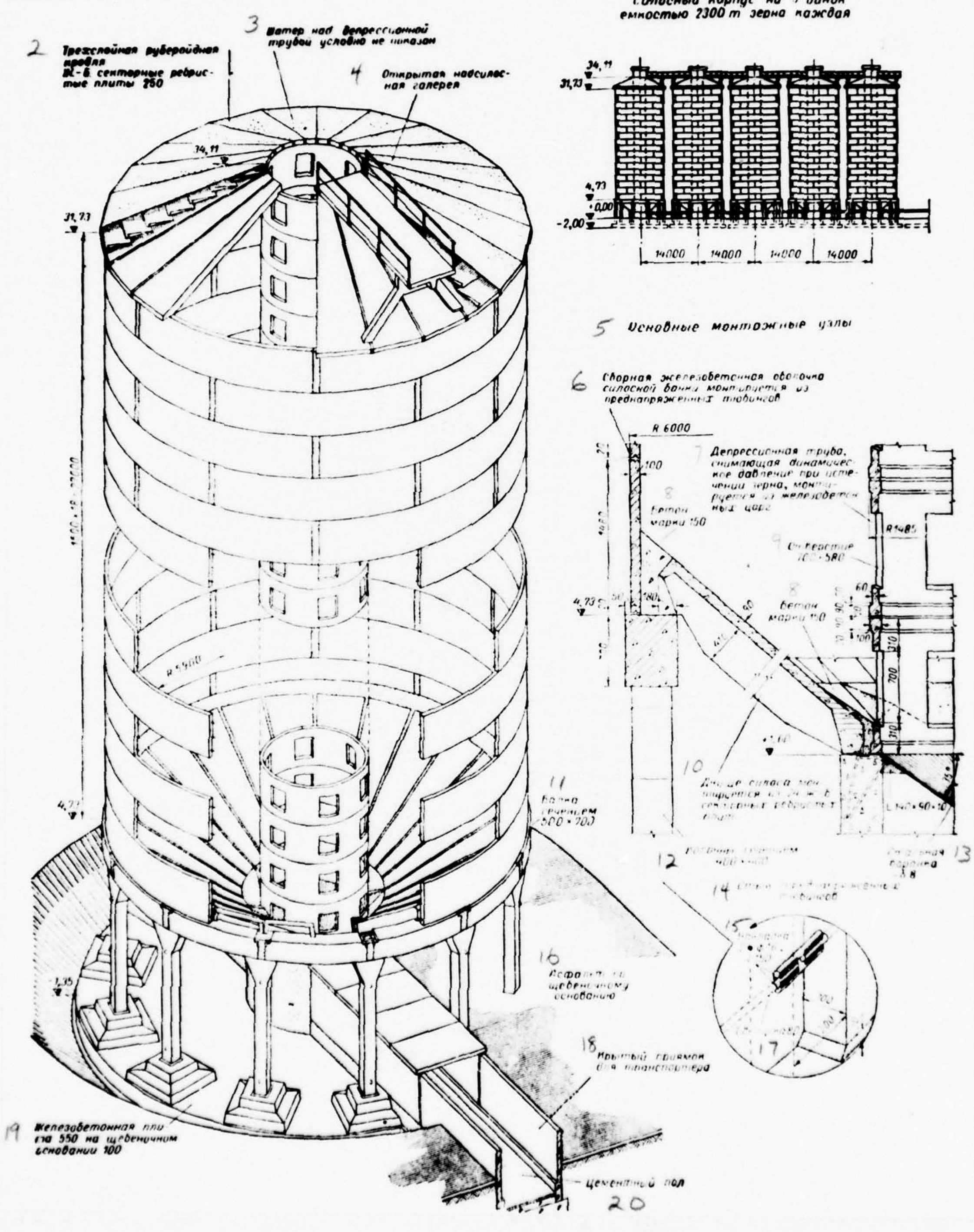
Key: 1 - cross section. 2 - joint of chute cell/elements. 3 - above-silo gallery of enclosure/protection frcm corrugated asbestos cement sheets on steel framework/body. 4 - steel frame. 5 - above-silo overlap it is reinforced-concrete plate/slab ... on steel beams. 6 - the walls of the jars of silo composite from is reinforced-concrete chute cell/elements .... enlarged into tubular furnace sections. 7 - concrete. 8 bottom - reinforced-concrete monolithic plate/slab on composite beams. 9 - steel funnel. 10 - below-silo deck composite reinforced-concrete columns by section/cut .... 11 - level of the knob/cap of rail .... 12 - monolithic reinforced-concrete base plate. 13 - plan/layout but the level of columns, plate/slab of bottom, beams and flooring slabs of silos. 14 - welded ... from .... 15 - anchor bolts of steel funnel. 16 - joint of the jars of silo. 17 - bolt .... 18 - in welds framework/bodies frcm ....

Sheet 88. Silo housing for a cement with the separate prestressed monolithic reinforced-concrete banks whose diameter is 18 m, and whose capacitance/capacity is 7300 m^3.



Key: 1 - above-silo gallery - framework/body of steel, enclosure/protection frcm the corrugated asbestos cement sheets of the intensive airfoil/profile. 2 - reinforced-concrete shaft/mine of staircase and elevator. 3 - running gangway. 4 - walls of jars from the monolithic reinforced concrete, squeezed by the winding on of high-strength steel helix. 5 - tent overlap from reinforced-concrete ribbed slabs. 6 - buta-cement mark/brand .... 7 - bottom banks from monolithic reinforced concrete. 8 - pit for track scales. 9 - pier for air channel. 10 - columns from the precast reinforced concrete. 11 - base plate from monolithic the iron of concrete.

Sheet 89. Silo housing for grain with the separate composite reinforced-concrete banks whose diameter is 12 m, and whose capacitance/capacity is 3000 m^3.



Key: 1 - silc housing tc 5 jars 2300 t in capacitance of grain each. 2 - three-layered rubercid roofing it is reinforced-concrete sector ribbed slabs .... 3 - the tent above the depression duct is not conditionally shown. 4 - open above-silo gallery. 5 - basic assembling units. 6 - the composite reinforced-concrete shell of silo jar it is installed from the prestressed tubes. 7 - the depression duct, which remove/takes dynamic pressure during the outflow of grain, it is installed from reinforced-concrete sheet-steel cylinder. 8 - concrete of mark/brand ..... 9 - hole .... 10 - the bottom of silo it is installed from ... reinforced-concrete sector ribbed slabs. 11 - beam by section/cut .... 12 - columns by section/cut .... 13 - steel funnel. 14 - joint of the prestressed tubes. 15 - cover plate .... 16 - asphalt on crushed stone basis/base. 17 - issue .... 18 - covered pit for a conveyer. 19 - reinforced-concrete plate/slab 550 on crushed stone basis/base ..... 20 - cement sex/floor.

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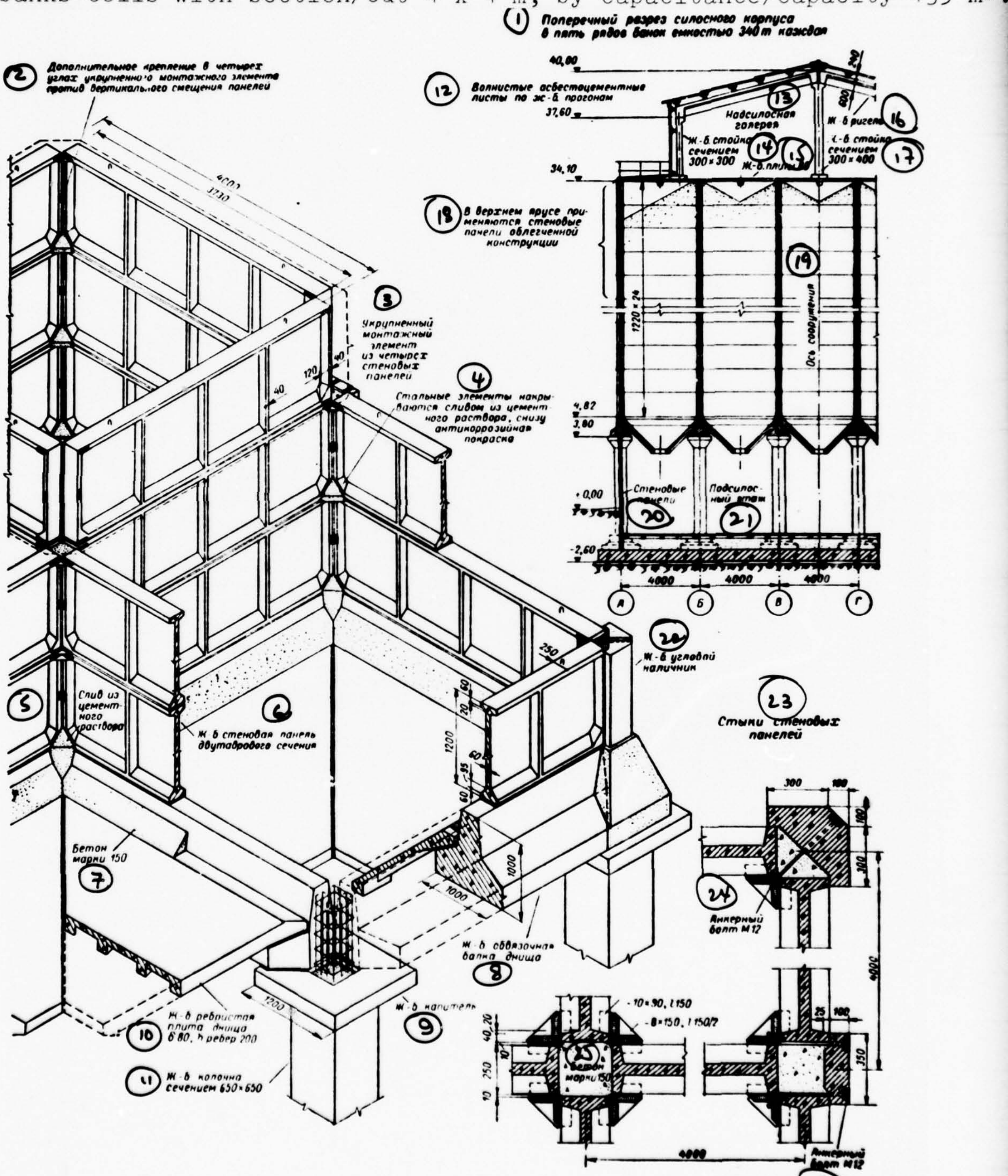
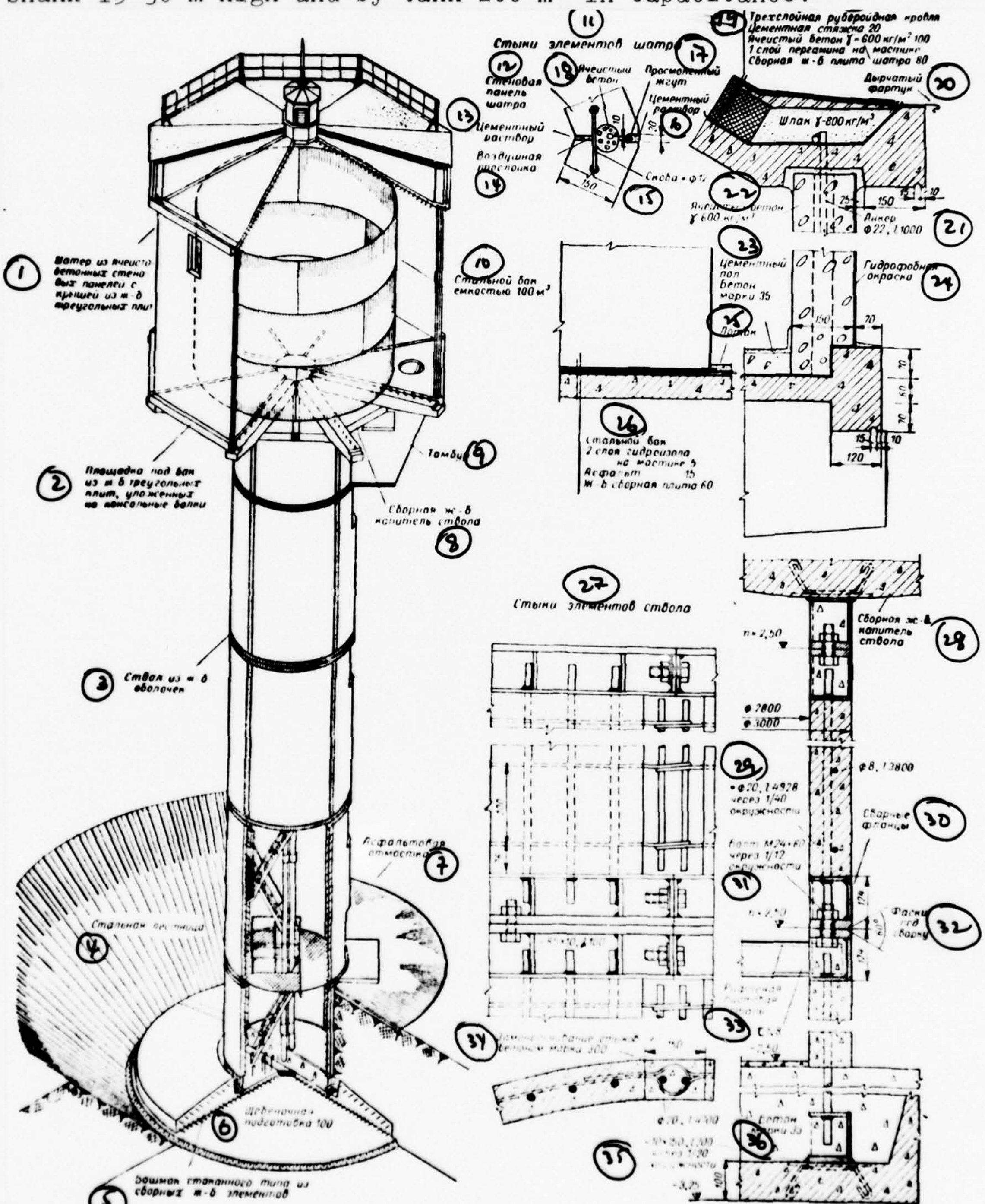
Sheet 90. Silo housing for grain with composite reinforced-concrete banks-cells with section/cut 4 x 4 m, by capacitance/capacity 435 m3.



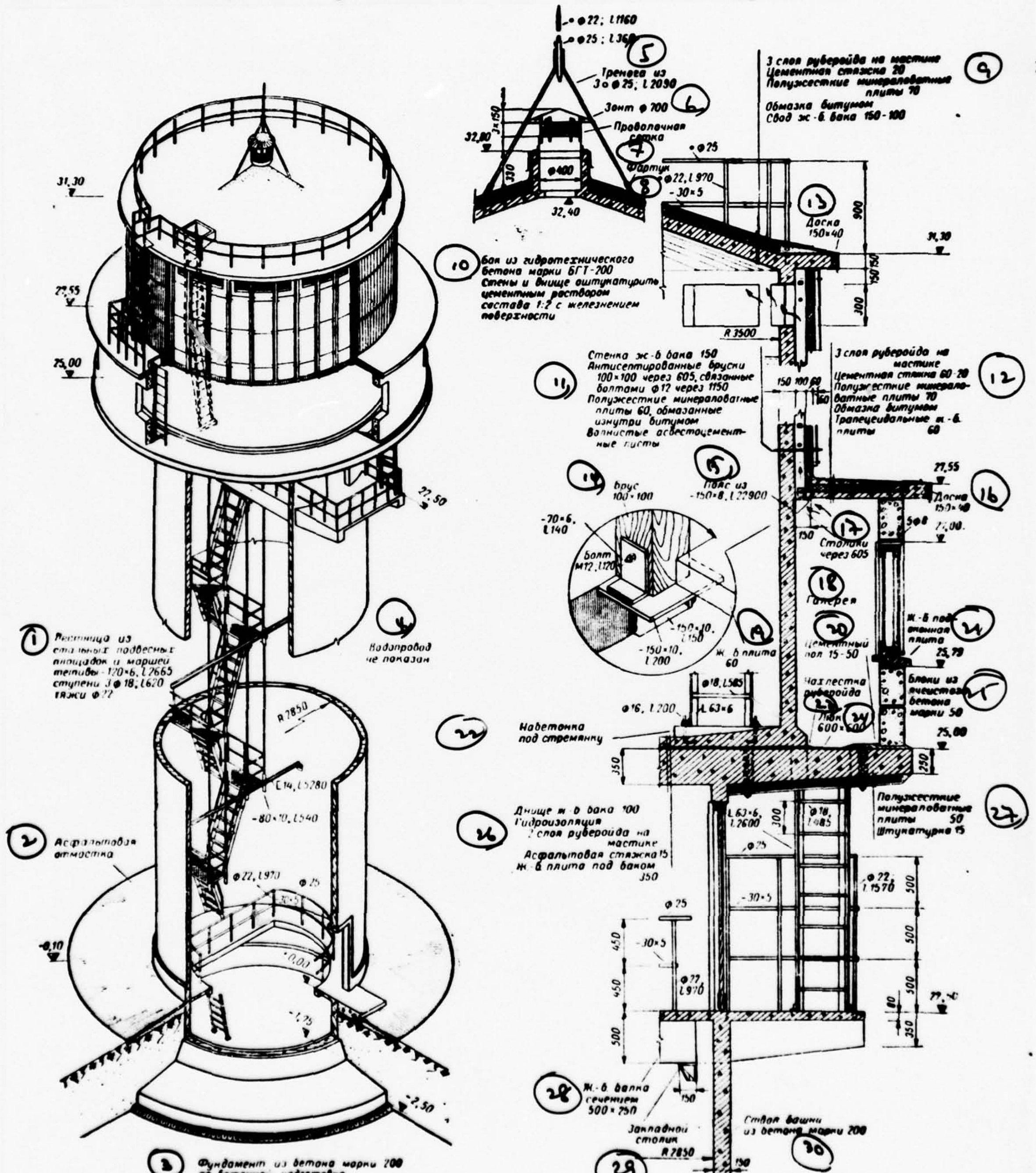
Key: 1 - the cross section of silo housing in five series of jars 340 t in capacitance each. 2 - additional fastening in four angles of the amalgamated assembling cell/element against the vertical shift of panels. 3 - amalgamated assembling cell/element of four wall panels. 4 - steel cell/elements they are covered with drain from cement mortar; from below anticorrosive coloring. 5 - drain from cement mortar. 6 - reinforced-concrete wall panel of double-T section/cut. 7 - concrete of mark/brand .... 8 - reinforced-concrete brace beam of bottom. 9 - reinforced-concrete is capital. 10 - reinforced-concrete ribbed slab of the bottom ... of fin/edges .... 11 - reinforced-concrete column by section/cut .... 12 - corrugated asbestos cement sheets on reinforced-concrete drive/girders. 13 - above-silo gallery. 14 - reinforced-concrete strut by section/cut .... 15 - reinforced-concrete plate/slabs. 16 - reinforced-concrete cross bar. 17 - reinforced-concrete strut by section/cut .... 18 - In upper tier are applied the wall panels of light construction. 19 - axle/axis of construction. 20 - wall panels. 21 - under-silo floor. 22 - reinforced concrete angular plate. 23 - joints of wall panels. 24 - anchor bolt ....

Sheet 91. Water tower from the precast reinforced concrete with shank 15-30 m high and by tank 100 m^3 in capacitance.



Key: 1 - tent from cellular concrete wall panels with roof from reinforced-concrete triangular plate/slabs. 2 - area/site under tank from the reinforced-concrete triangular plate/slabs, packed to cantilever beams. 3 - shank from reinforced-concrete shells. 4 - steel staircase. 5 - glass type shoe from composite reinforced-concrete cell/elements. 6 - crushed stone preparation 100. 7 - asphalt blind area. 8 - composite reinforced-concrete capital of shank. 9 - reel. 10 - steel tank. 11 - joints of the cell/elements of tent. 12 - wall panel of tent. 13 - cement mortar. 14 - air seal. 15 - bracket .... 16 - cement mortar. 17 - tarred band. 18 - cellular concrete. 19 - three-layered ruberoid roofing. Cement tie piece 20. Cellular concrete γ = of 600 kg/m² 100. 1 layer of pergamyn on mastic. Composite reinforced-concrete plate/slab of tent 80. 20 - perforated apron. 21 - anchor .... 22 - cellular concrete γ = of 600 kg/m³. 23 - cement sex/floor. Concrete of brand 35. 24 - hydrophobic coloration. 25 - tray/chute. 26 - steel tank. 2 layers of hydroisol on mastic 5. Asphalt 15. Reinforced-concrete composite plate/slab 60. 27 - joints of the cell/elements of shank. 28 - composite reinforced-concrete capital of shank. 29 - ... through 1/40 circumference. 30 - welded flanges. 31 - bolt ... through 1/40 circumference. 32 - facet/bevels under welding. 33 - riffled sheet steel. 34 - monolithization it is butting by concrete of brand 300. 35 - ... through 1/20 circumference. 36 - concrete of brand 35.

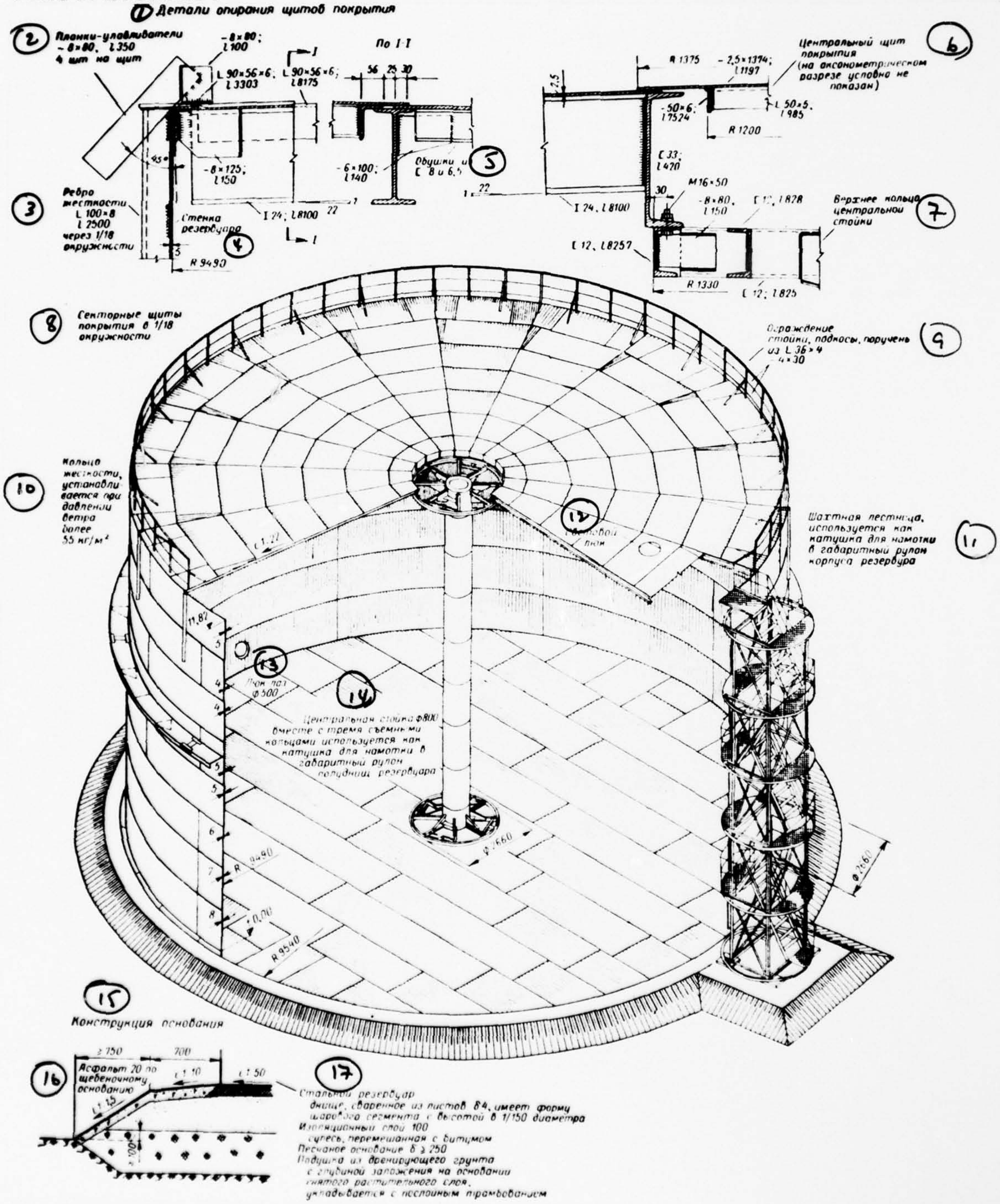
Sheet 92. Standard water tower from monolithic reinforced concrete with shank 15-35 m high and by tank 200 m^3 in capacitance.



Key: 1 - staircase from steel suspension area/sites and the marchs of the bowstring ... steps... belts .... 2 - asphalt blind area. 3 - foundation from concrete of brand 200 on concrete preparation. 4 - water pipe it is not shown. 5 - tripod from .... 6 - hood .... 7 - wire net. 8 - apron. 9 - 3 layers of ruberoid on mastic. Cement tie piece 20. Semirigid mineral wool plate/slabs 70. Greasing by bitumen. Arch/summary of reinforced-concrete tank 150-100. 10 - tank from hydraulic engineering concrete of brand bgt-200. Walls and bottom to plaster by cement mortar of composition 1:2 with the iron plating of surface. 11 - wall of reinforced-concrete tank 150. Disinfected bars 100x100 through 605, connected by bolts ⌀ 12 through 1150. Semirigid mineral wool plate/slabs 60, greased from within by bitumen. Corrugated asbestos cement plate/slabs. 12 - 3 layers of ruberoid on mastic. Cement tie piece 60-20. Semirigid mineral wool plate/slabs 70. Greasing by bitumen. Trapezoidal reinforced-concrete plate/slabs 60. 13 - panel .... 14 - beam 100x100. 15 - belt/zone from .... 16 - panel .... 17 - stands through 605. 18 - gallery. 19 - reinforced-concrete plate/slab 60. 20 - cement sex/floor. 21 - reinforced-concrete window stool plate/slab. 22 - concreting under u-belt. 23 - lap of ruberoid. 24 - hatch 600x600. 25 - blocks from cellular concrete of brand 50. 26 - bottom of reinforced-concrete tank 100. Waterproofing. 2 layers of ruberoid on mastic. Asphalt tie piece 15. Reinforced-concrete plate/slab under tank 350. 27 -

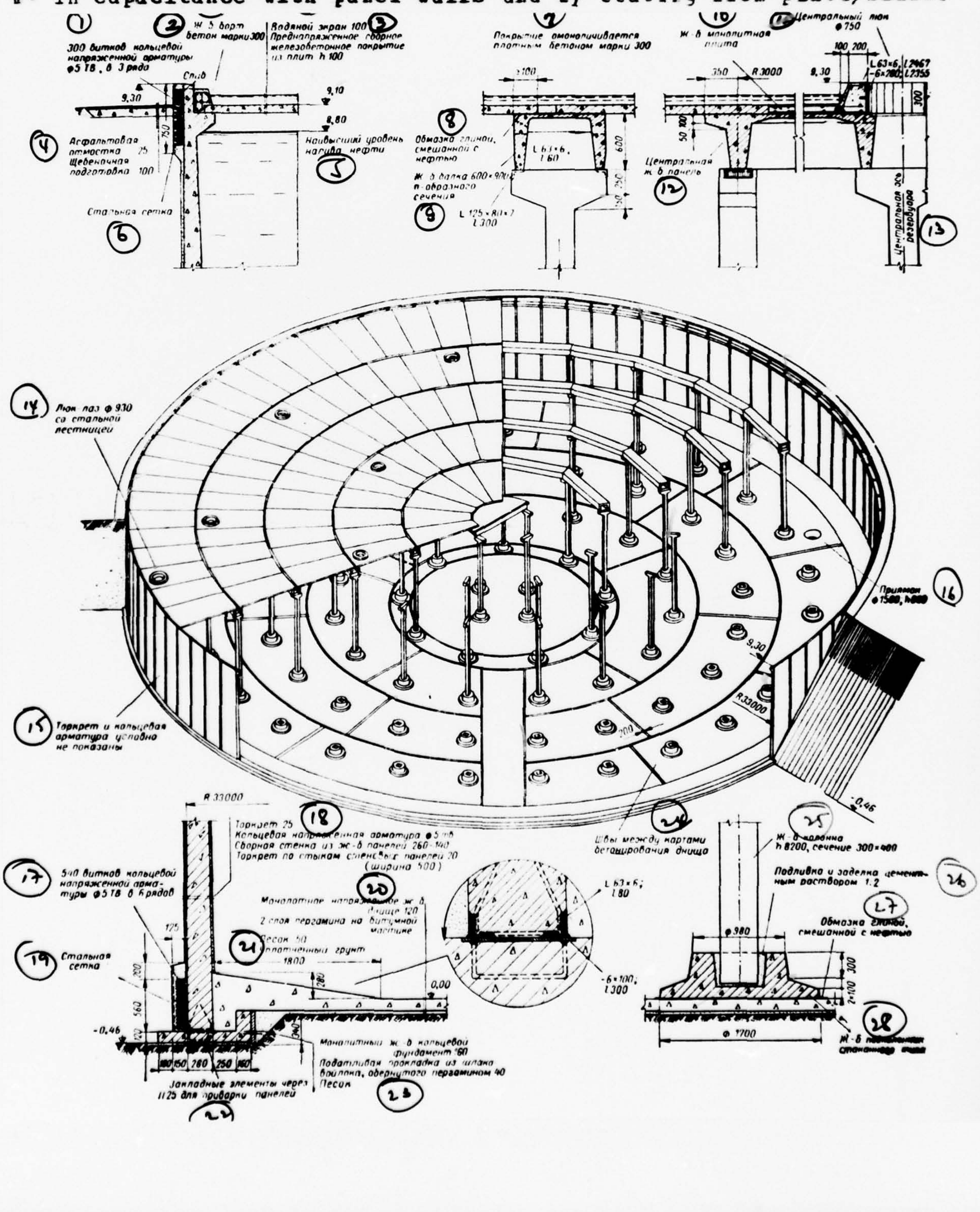
semirigid mineral wool plate/slabs 50. Plasterer 15. 28 - reinforced-concrete beam by section/cut 500x250. 29 - laying stand .... 30 - shank of tower from concrete of brand 200.

Sheet 93. Standard ground-based steel reservoir for oil-products 3000 m^3 in capacitance with wall and by bottom made of rollable constructions.



Key: 1 - parts of the support of the panels of coating. 2 - Planks-traps .... 4 pieces to panel. 3 - stiffering rib ... through 1/18 circumference. 4 - wall of reservoir. 5 - pickaxes from .... 6 - central panel of the coating (on axonometric cut/section is not conditionally shown). 7 - upper ring of central strut. 8 - sector panels of coating in 1/18 circumference. 9 - enclosure/protection of strut, braces, handle from .... 10 - the ring of rigidity, is establish/installed at wind pressure of more than 55 kg/m². 11 - mine/shaft staircase, it is utilized as coil for a winding/coil into the overall reel/cylinder of the housing of reservoir. 12 - light hatch. 13 - hatch manhole .... 14 - central strut ⌀ 800 together with three removable rings it is utilized as coil for a winding/coil into the overall reel/cylinder of semiplatform of reservoir. 15 - construction of basis/base. 16 - asphalt 20 on crushed stone basis/base. 17 - steel reservoir: the bottom, welded from sheets ... has a form of calotte 1/150 diameter in height. Insulating layer 100: the sandy loam, mixed with bitumen. Sand basis/base .... Pillow from the draining soil with the depth of laying on the basis of the removed vegetable layer, is packed with laminar tamping.

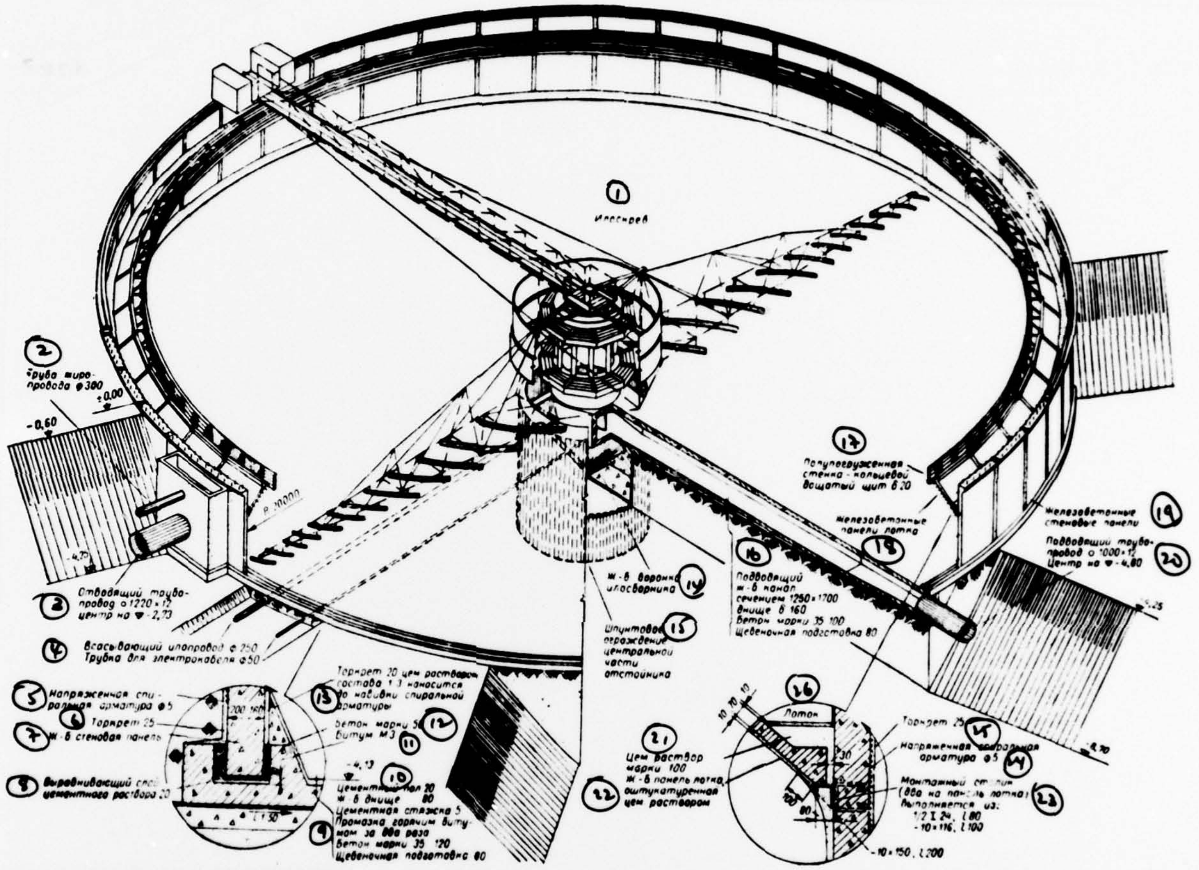
Sheet 94. Sunk reinforced-concrete reservoir for oil-products 30.000 m³ in capacitance with panel walls and by coating from plate/slabs.



Key: 1 - 300 turns of the circular stressed fittings ..., in 3 series. 2 - reinforced-concrete edge, concrete of brand 300. 3 - water screen 100. Prestressed composite reinforced-concrete coating from plate/slabs .... 4 - asphalt blind area 25. Crushed stone preparation 100. 5 - highest level of the infusion of petroleum. 6 - steel mesh. 7 - coating it is monolithicized by dense concrete of brand 300. 8 - greasing by the clay, mixed with petroleum. 9 - reinforced-concrete beam 600x900 of top-hat. 10 - reinforced-concrete monolithic plate/slab. 11 - central hatch .... 12 - central reinforced-concrete panel. 13 - central axle/axis of reservoir. 14 - hatch manhole ... with steel staircase. 15 - gunite and circular fittings are not conditionally shown. 16 - pit .... 17 - 540 turns of the circular stressed fittings ... in six series. 18 - gunite 25. Circular stressed fittings ... IV. Composite wall from reinforced-concrete panels .... Gunite on the joints of wall panels 20 (width 500). 19 - steel mesh. 20 - monolithic stressed reinforced-concrete bottom 120. Two Layers of pergamyn on bitumastic. 21 - sand 50. Condensed soil. 22 - laying cell/elements through ... for welding of panels. 23 - monolithic reinforced-concrete circular foundation 160. Pliable packing from slag matting, wrapped up by pergamyn 40. Sand. 24 - welds between the map/charts of the concreting of bottom. 25 - reinforced-concrete column ..., section/cut 300x400. 26 - dressing and framing by cement mortar 1:2.

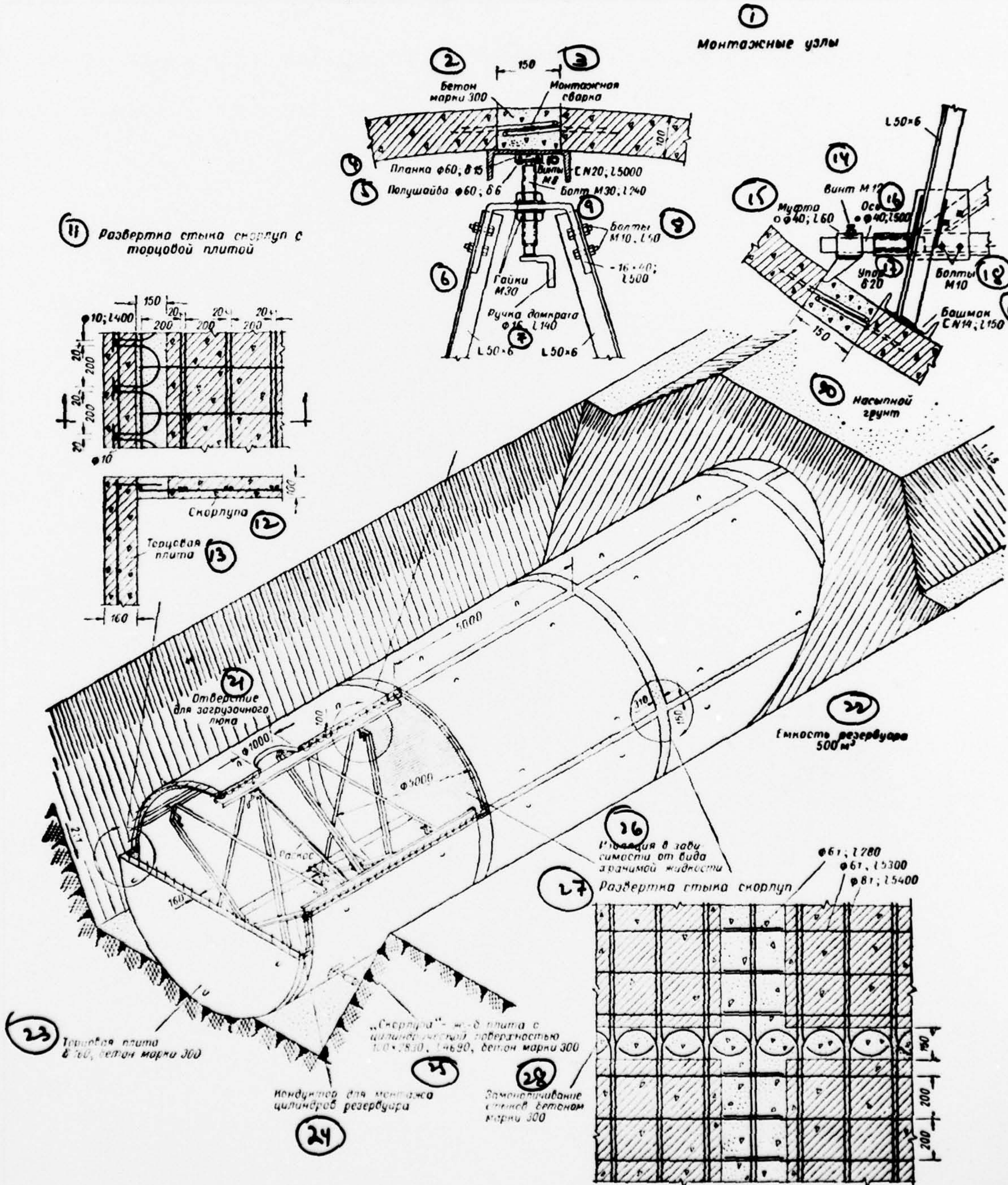
27 - greasing by the clay, mixed with petroleum. 28 - glass type reinforced-concrete base.

Sheet 95. Sunk open reinforced-concrete reservoir-sump 4500 m^3 in capacitance with panel walls.



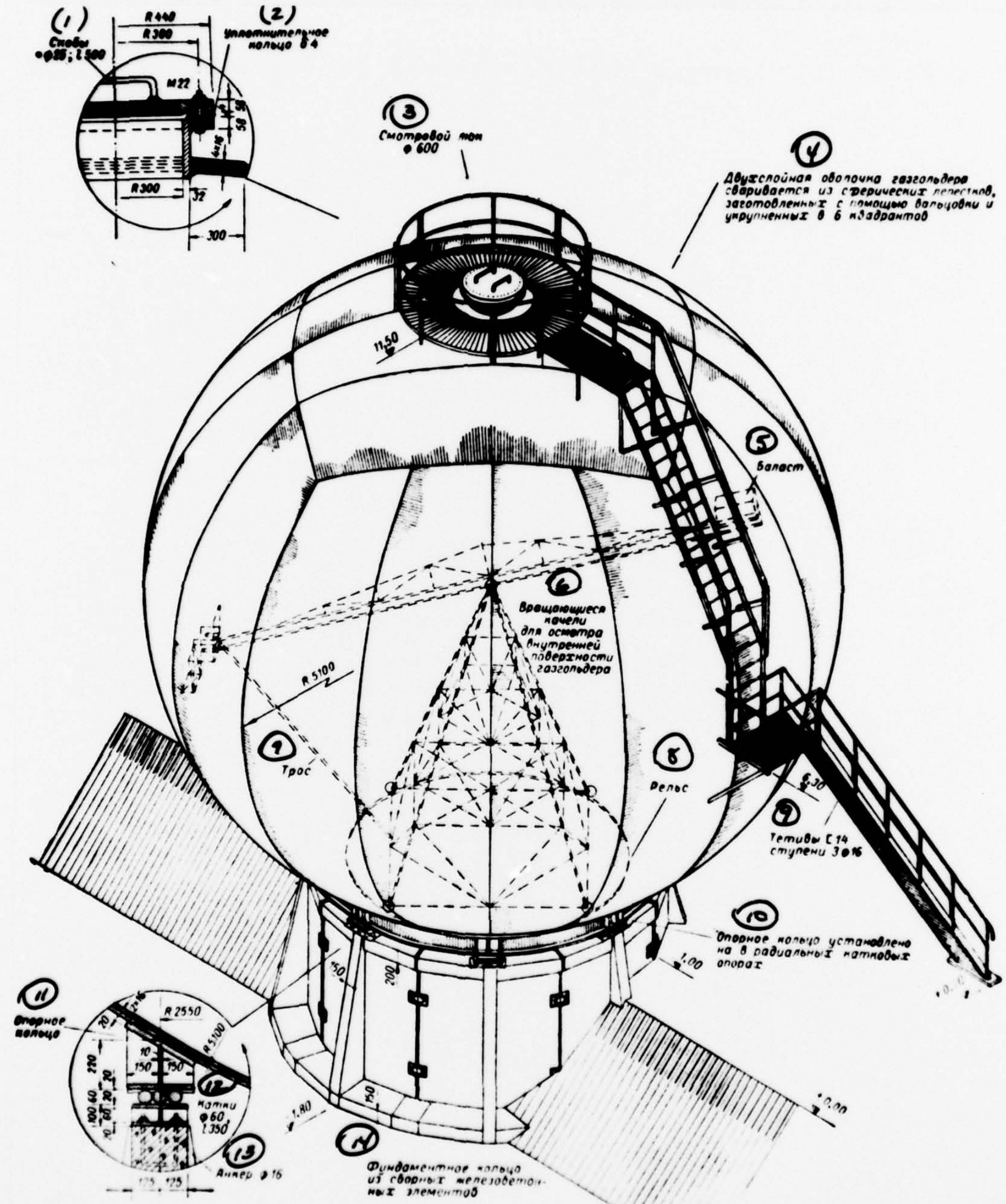
1 - silt scrub. 2 - duct of grease line.... 3 - drain pipe ...., center on .... 4 - suction silt line.... Tube for an electric cable .... 5 - stressed spiral fittings .... 6 - gunite 25. 7 - reinforced-concrete wall panel. 8 - leveling layer of cement mortar 20. 9 - cement tie piece 20. Smearing by hot bitumen two times. Concrete of brand 35 - 120. Crushed stone preparation 80. 10 - cement sex/floor 20. Reinforced-concrete bottom 80. 11 - bitumen M3. 12 - concrete of brand 50. 13 - gunite 20 by cement mortar of composition 1:3 it will be applied to the winding on of spiral fittings. 14 - reinforced-concrete funnel of silt collector. 15 - groovy enclosure/protection of the center section of the sump. 16 - supplying reinforced-concrete channel by section/cut .... bottom .... Concrete of mark/brand .... Crushed stone preparation. 17 - semisubmersed wall - circular plank shield .... 18 - reinforced-concrete panels of tray/chute. 19 - reinforced-concrete wall panels. 20 - supply line .... Center on .... 21 - cement mortar of brand 100. 22 - reinforced-concrete panel of tray/chute, plastered by cement mortar. 23 - assembling stand (two to the panel of tray/chute) it is fulfilled from: .... 24 - stressed spiral fittings .... 25 - gunite 25. 26 - tray/chute.

Sheet 96. Underground fully assembled reinforced-concrete reservoir 500 m^3 in capacitance.



Key: 1 - assembling units. 2 - concrete of brand 300. 3 - erection welding. 4 - Planck .... 5 - half-washer .... 6 - nuts M30. 7 - arm/knob/handle of jack. 8 - bolts .... 9 - bolt .... 10 - screw/propellers .... 11 - the scan/development of joint of shell with end-type plate/slab. 12 - shell. 13 - end-type plate/slab. 14 - screw/propeller .... 15 - clutch ..... 16 - axle/axis .... 17 - detent .... 18 - bolts .... 19 - shoe .... 20 - filled soil. 21 - hole for loading hatch. 22 - tankage .... 23 - end-type plate/slab δ160, concrete of brand 300. 24 - conductor for assembly cylinders of reservoir. 25 - "shell" -..... plate/slab with cylindrical surface..... concrete of brand 300. 26 - insulation/isolation depending on the form of stored liquid. 27 - scan/development of the joint of shells. 28 - monolithization it is butting by concrete of brand 300.

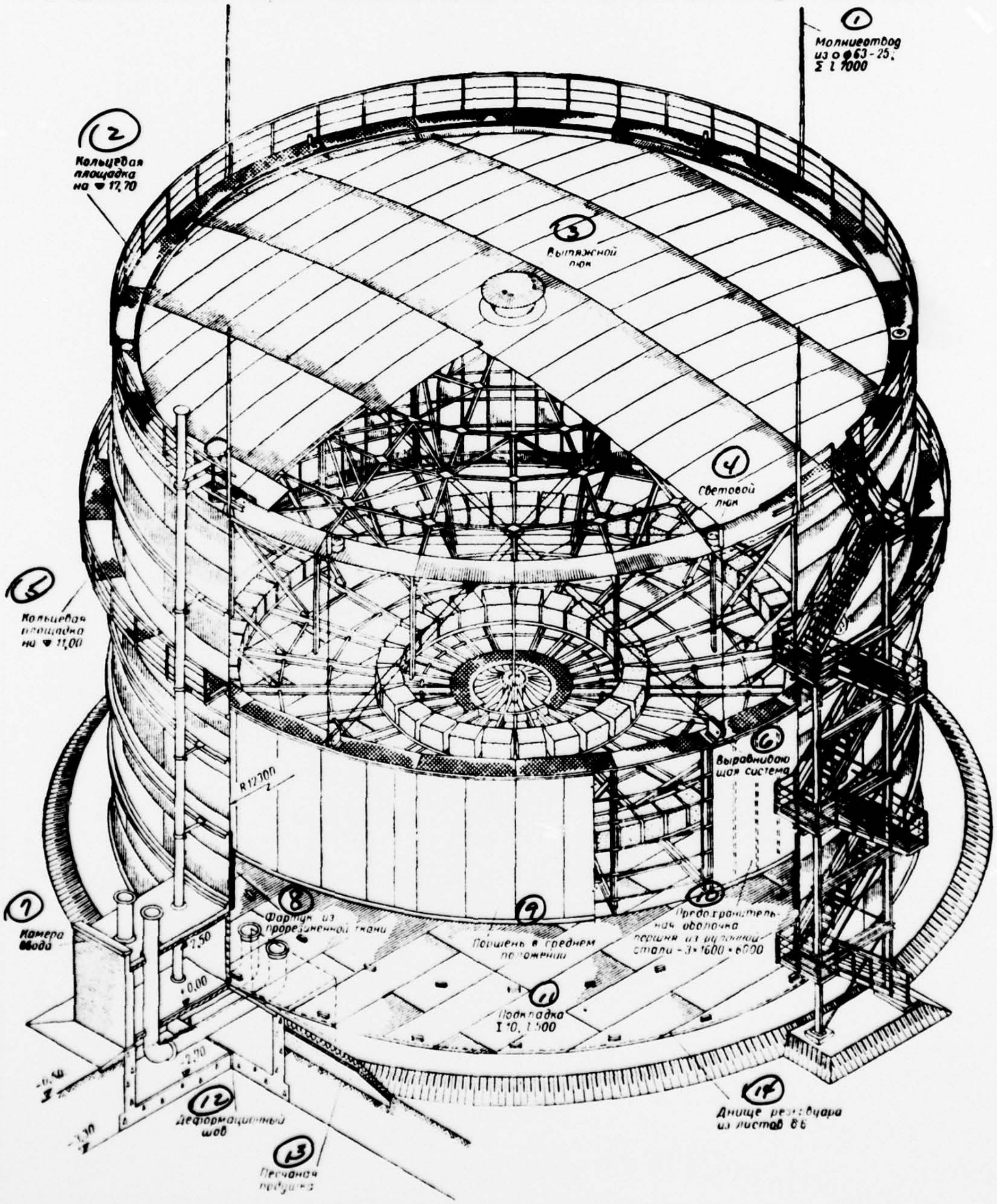
Sheet 97. Heat gasholder 550 m^3 in capacitance, pressure up to 16.4 atm(gage).



Key: 1 - brackets ..... 2 - ferrule ..... 3 - inspection hatch .... 4 - the two-layered shell of gasholder is welded from the spherical lug/lobes, prefabricated with the aid of rolling and amalgamated into 6 quadrants. 5 - balance. 6 - rotating swing for the inspection of the internal surface of gasholder. 7 - cable. 8 - rail. 9 - bowstrings ... of step/stage .... 10 - 'carrier ring is establish/installed on in radial roller bearings. 11 - carrier ring. 12 - cylinders .... 13 - anchor .... 14 - foundation ring from composite reinforced-concrete cell/elements.

Sheet 98.

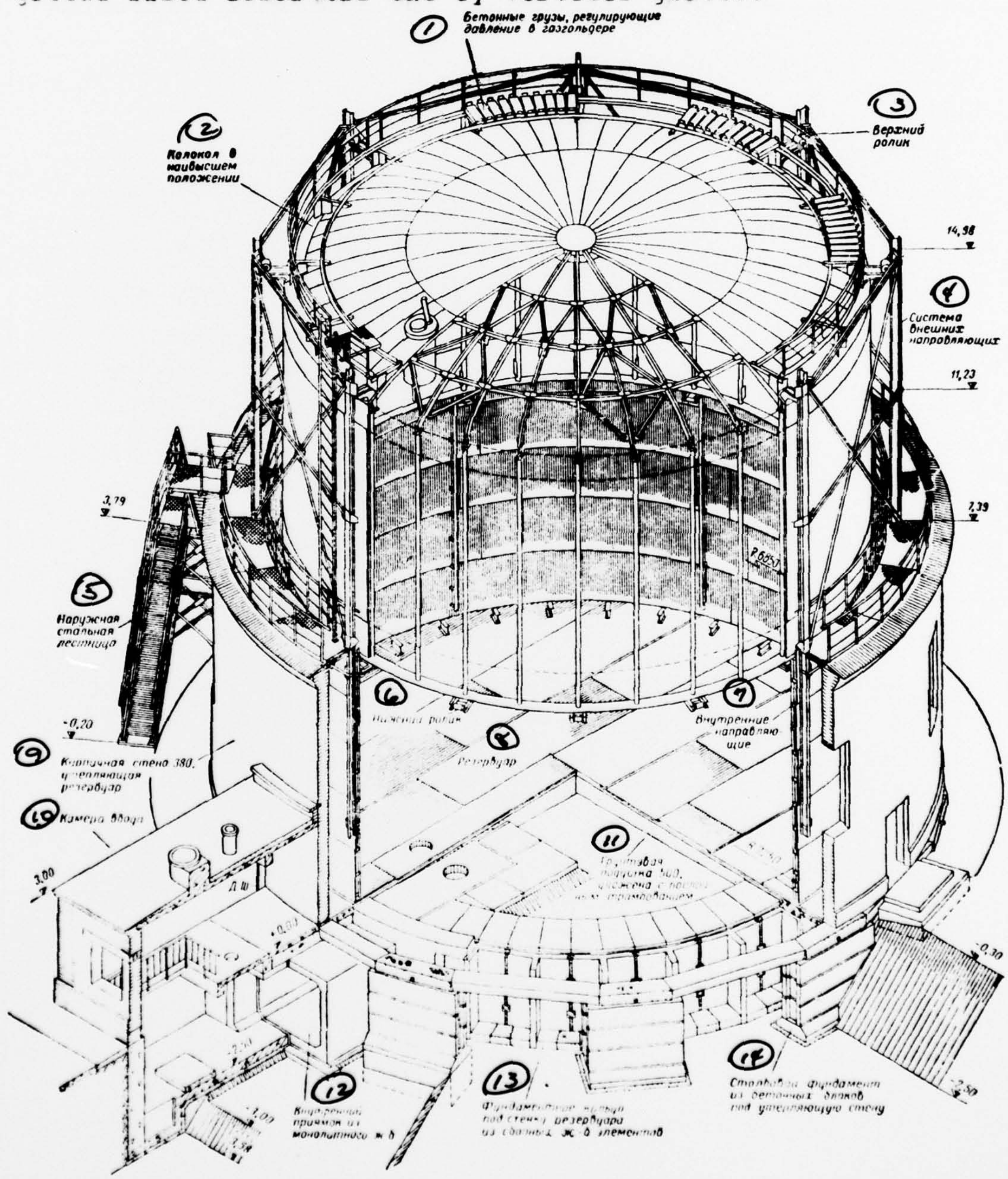
Dry gashclder with rubber section 500 m³ in capacitance.



Key: 1 - lightning control from .... 2 - circular area/site to ... / 3 - exhaust hatch. 4 - light hatch. 5 - circular area/site on .... 6 - leveling system. 7 - camera/chamber of input/introduction. 8 - apron from rubberized fabric. 9 - piston in the middle position. 10 - protective shell of piston made of roll steel .... 11 - block/backing .... 12 - deformation weld. 13 - sand pillow. 14 - bottom of reservoir from sheets ....

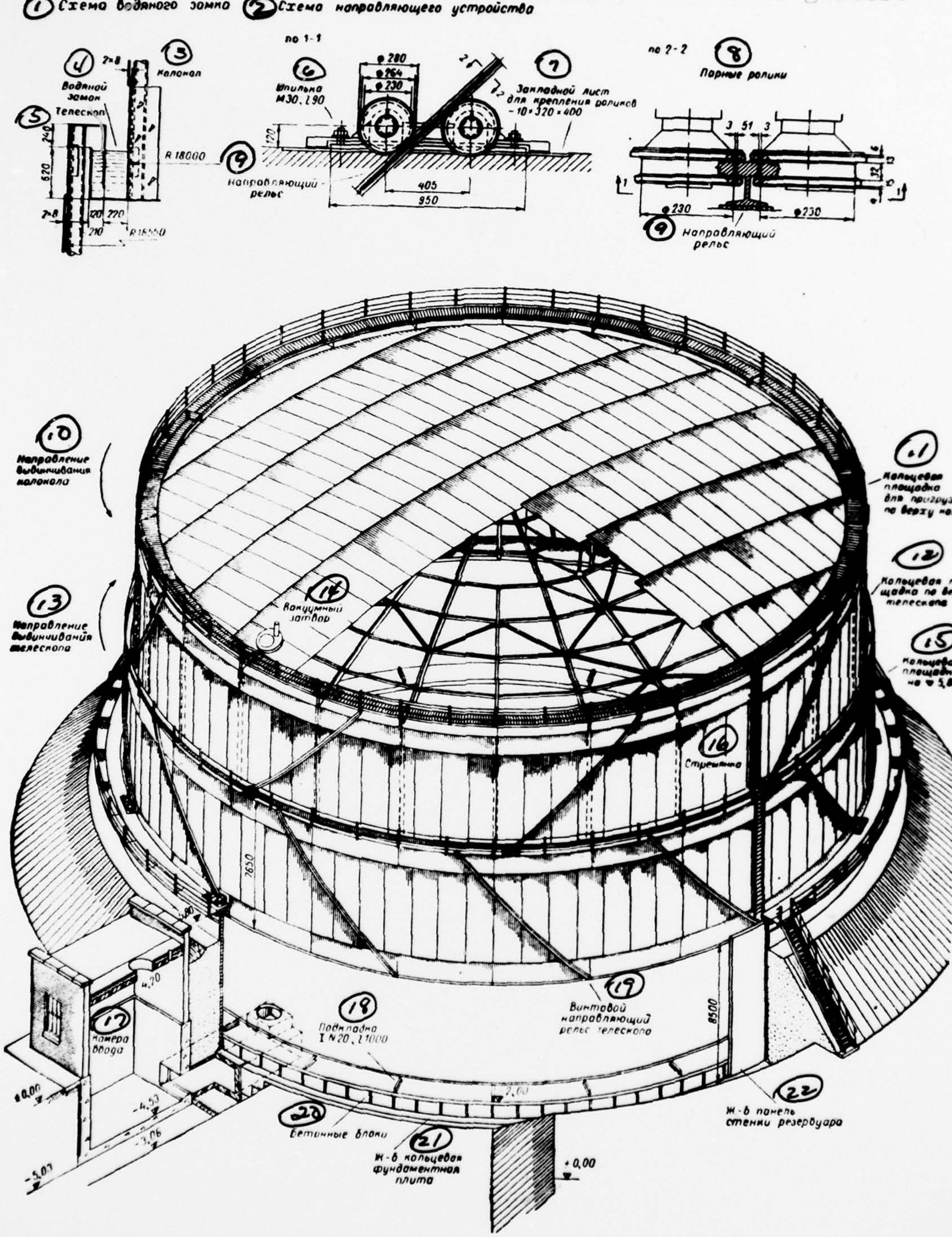
Sheet 99.

Wet single-section gasholder 1000 m³ in capacitance with steel ground-based reservoir and by vertical guides.



Key: 1 - concrete loads, which gauge pressure in gasholder. 2 - bell jar in the highest position. 3 - upper roller. 4 - system of external guides. 5 - external steel stairs. 6 - lower roller. 7 - internal guides. 8 - reservoir. 9 - brick wall ... warming reservoir. 10 - camera/chamber of input/introduction. 11 - ground pad ... it is packed with laminar ramming. 12 - internal pit from monoarmour ..... 13 - foundation ring under the wall of reservoir from composite ... cell/elements. 14 - column foundation from concrete blocks under the warming wall.

Sheet 100. Wet two-unit gasholder 15000 m^3 in capacitance with the reinforced-concrete sunk reservoir and helical guides.



Key: 1 - schematic of water lock. 2 - schematic of guide. 3 - bell jar. 4 - water lock. 5 - telescope. 6 - pin .... 7 - laying sheet for fastening of rollers .... 8 - conjugate rollers. 9 - guide rail. 10 - direction of the unscrewing of bell jar. 11 - circular area/site for a surcharge weight on the top of bell jar. 12 - circular area/site on the top of telescope. 13 - direction of the unscrewing of telescope. 14 - vacuum seal. 15 - circular area/site on .... 16 - u-bolt. 17 - chamber of input/introduction. 18 - block/backing ..... 19 - spiral guide rail of telescope. 20 - concrete blocks. 21 - ... circular base plate. 22 - ... the panel of the wall of reservoir.

end T930143

end section

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C509	BALLISTIC RES LABS	1	E408	AFWL	1
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